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ABSTRACT

Five papers focus on issues of early intervention with young hearing impaired children. The papers were presented at a seminar in 1981 in Queensland, Australia. A. Hayes begins with "The Emergence of Interest in Social Interaction in Infancy," in which he considers the role of metaphors in influencing intervention research. D. Power and G. Elias follow with "Developing Language in Young Disabled Children," which examines the form, content, and function of language. "Research on Mothers Interacting with Hearing Impaired Children" by T. Cross et al. reviews findings regarding syntax, stereotyped utterances, discourse features, speech style variables, and functional codes. In the fourth paper, H. Mohay reports on "A Longitudinal Study of the Language Development of Three Deaf Children of Hearing Parents." The final paper, by M. Hyde et al. presents results from their study entitled "The Use of Verbal and Non-Verbal Control Techniques by Mothers of Hearing Impaired Infants." (CL)

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CENTRE for HUMAN DEVELOPMENT STUDIES

EARLY INTERVENTION WITH YOUNG HEARING-IMPAIRED CHILDREN

Edited by D.J. Power
G.C. Elias
and H.B. Hyde

EC170057

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Funds for the Seminar at which the papers herein were delivered were provided by Lions International District Q5.

MT. GRAVATT COLLEGE OF ADVANCED EDUCATION

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July, 1981

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FOREWORD

The papers herein were presented at a Seminar on Early Intervention for Young Hearing-Impaired Children conducted as part of Lions International Early Education Research and Development Programme for Hearing-Impaired Children and their Families. Funds for the Seminar were provided by the Lions International District Q5 and the Division of Special Education of the Queensland Department of Education. We are grateful to both these bodies for their support.

The Seminar was conducted by the Centre for Human Development Studies at Mt. Gravatt College of Advanced Education on June 15 - 16, 1981. The paper by Power and Elias is a revision of separate ones delivered then. The Hyde, Elias and Power paper was originally published as Research Report No. 5 of the Centre for Human Development Studies in November, 1980.

We hope that these papers will stimulate discussion and research in this important area of education of the hearing-impaired.

DJP
GCE
MBH
July, 1981.

THE EMERGENCE OF INTEREST IN SOCIAL INTERACTION IN INFANCY

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University of Queensland

Metaphor, Models and Mother-Infant Interaction

Assumptions about the nature of the infant and the processes of human development have undergone marked transformations, resulting, in turn, in changes in theory and methodology over the last two decades. Succinctly summarised, the transformation represents a wider acceptance of the metaphor of the human infant as an active organism (Overton, 1976). This acceptance has in large part been the dynamic for much of the recent interest in social behaviour in infancy.

Metaphors exert a powerful influence upon the organization of research. The "general theoretical models" of science are, according to Reese and Overton (1970) "metaphorical" in nature. They represent the organising constructs which guide empirical research: the philosophical and ideological components of the scientist's Weltanschauung.

Two metaphors have exerted a particularly powerful influence upon the development of Western science, an influence which is particularly apparent in psychology. These can be labelled the "mechanistic" and the "organismic" models (Overton, 1976; Overton & Rees, 1973; Rees & Overton, 1970). Briefly stated: "In the mechanistic world view, the model for all phenomena is the machine; in the organismic world view, the model is the biological organism and its activities" (Rees & Overton, 1970, p. 117). Each model represents a fundamentally different way of viewing the phenomena of interest and the methods appropriate to their study.

Experimental psychology in the first half of the twentieth century seemed predominantly to be framed within the mechanistic world view.

Its influence is still widely evident. The organismic model, however, is attracting an increasing set of adherents. Within studies of infancy, implicit adherence to the organismic model has led to an increasing acceptance of the view of the infant as an active organiser of experience: "one that gives form to its experience" (White, 1976, p. 100). As Schaffer (1971) puts it:

> Infants, we have learned, are not empty vessels to be filled with as much experience as we can cram into them; they are active partners in even the earliest social encounters and a much finer analysis is, therefore, required--an analysis that will take into consideration not only the stimulation offered by the mother but also the infant's own characteristics and what these, in turn, evoke in maternal responsiveness. (pp. 174-175)

Bidirectionality of Effects and the Need for Dyadic Analysis

Prior to the 1960s social influence was viewed by most theorists as a unidirectional process, from parent to child. While the essentially bidirectional nature of social encounters had been recognized by some theorists, the intellectual climate was such that the concept of mutual effects did not find a wide contemporary acceptance (Gerwirtz & Boyd, 1976). Its acceptance now, however, is widespread, as much so that adherents to both the mechanistic and organismic models recognize that the infant can affect the caregiving environment in important ways, and that there is a mutual flow of influence in parent-child interactions (Gewirtz & Boyd, 1976).

The recent acceptance of the bidirectionality of influences in infancy and childhood is the product of a multifaceted process of intellectual change. For example, the influential paper by Bell (1968) conveyed the basic message that "pieces of knowledge that had become fairly well established in the literature on socialization were not knowledge at all" (Maccoby, 1979, p. 5) and that correlational evidence did not provide a basis for imputing the direction of effect. Bell's argument fitted well with changes occurring in related areas.

One of these changes was the re-examination of Piagetian cognitive developmental theory by American developmental psychologists in the 1960s, following an earlier period of limited interest in the 1930s and then a long period of rejection (Bell & Harper, 1977; Cairns & Ornstein, 1979; Maccoby, 1979). In Piagetian theory, the infant is not simply a smaller version of the adult, but a person at a structurally distinct stage of human development, with the capacity to influence, and be influenced by, the surrounding environment.

At the same time, an increase occurred in the contributions to the conceptualisation of human development of findings and concepts from ethology and comparative psychology. Developmental psychologists became particularly receptive to arguments for the need to consider data on the powerful influence that the young of infra-human species have upon the behaviour of their parents. The appearance of the first volume of Bowlby's (1969) Attachment and Loss further focused attention upon the need to consider ethological evidence with regard to the salience of social influences, the importance of the social environment of early childhood, and the implicit bidirectionality of attachment and bonding.

Ironically, much of the evidence of the essentially active nature of the infant, and the powerful effects of infant behaviour upon the surrounding environment was accumulating within the compass of behaviourist research (White, 1976). For example, Rheingold (1966, 1969) and Moss (1967) both recognised that an infant's behaviour frequently acts to shape the mother's behaviour. As Rheingold (1966) put it "the infant, by his appearance and behavior, modifies the behavior of other social objects. He not only evokes responses from them but maintains and shapes their responses by reinforcing some and not others" (p. 12). Further, it became apparent that within a bidirectional interaction a behaviour can be both a response to a partner's immediate prior behaviour and, in turn, the stimulus for the partner's subsequent behaviour (Papousek & Papousek, 1977). All told, awareness of the need for reciprocal models of social behaviour is growing, even if in a somewhat inchoate manner, within the traditionally mechanistic schools of psychology.

With the recognition that the infant could influence the surrounding environment, the traditionally monadic, unidirectional models of infant social development were no longer appropriate. Models could be bidirectional, however, without being interactive. That is, each person could be seen as influencing the other, but these influences could still be studied separately. The need to work directly with interactions rather than with separate elements had also been noted earlier by Murray (1938) and Sears (1951). Sears (1951) noted that a readiness to think interactionally was slow to take root; "in spite of their long prepossession with social influences on the individual, psychologists think monadically. That is, they choose the behaviour of one person as their scientific subject matter. For them the universe is composed of individuals." (pp. 478-479).

Caldwell and Hersher (1964) echoed Sears' plea for conceptualizing the relationships between people at least in terms of dyadic units:

> In most studies of mother-infant interaction, a monadic theoretical model has been implicitly or explicitly employed. That is, the influence of the maternal personality (or attitudes, or family climate) upon the relatively unstructured personality of the infant has been of major concern. But such a model does not sufficiently weight the influence upon maternal behavior of the infant's emergent personality at any given time. What is needed, therefore, is a dyadic model which can hopefully deal with the needs, resources, and inadequacies of both members of the mother-infant interaction system. (p. 276)

A decade later, Lewis and Lee-Painter (1974) concluded that "only through interaction can we study, without distortion, human behavior" (p. 21). As Cairns (1977) concluded "the dyad has become the preferred unit of analysis, not the responses of individuals taken separately. Even when dyadic language is not employed, writers today are sensitive to mutual contingencies within relationships," (p. 2).

The Social Infant

At the same time as the dyad was emerging as "the preferred unit of analysis" (Cairns, 1977, p. 2), the importance of social contact upon the development of the infant was becoming of greater interest. The realisation that the meaning of much of human behaviour can only be understood in an interpersonal context was beginning to exert an influential force on psychology. Schaffer (1977) summarises the situation as follows:

> many functions traditionally treated in psychology as though they "belonged" to individuals and could thus be studied purely as intrapersonal events generally occur within an interpersonal context and . . . it is from this context that they derive their functional meaning. (p. 3)

Personality theory showed a similar rising stress on the determining effects of contexts and situations. This trend encountered the entrenched trait theories of personality with their traditional focus upon stable individual characteristics. However, the trend to emphasise situations as the exclusive determiners of behaviour has also attracted criticism (Bowers, 1973). Both extremes have been disavowed by Mischel (1973), who pointed to the need for considering person-situation interactions, with the person defined as actively constructing experience. The Scottish philosopher John MacMurray (1970) succinctly expressed the position "(the infant) can live only through other people and in dynamic relation with them. In virtue of this fact he is a person, for the personal is constituted by the relations of persons" (p. 51, emphasis added). In psychology Rheingold (1969) echoed MacMurray's thoughts in the following terms "the human infant is born into a social environment, he can remain alive only in a social environment; and from birth he takes his place in that environment" (p. 781). The social environment is now viewed as the forum for many of the fundamentally important developments of infancy.

The pre-adaptedness of the infant for social interaction has also emerged as a key concept (Newson, 1977; Schaffer, 1977, 1979; Trevarthen, 1977). Newson and Newson (1975) have asserted that the infant is "innately primed' to participate in complicated social rituals" (p. 440).

A less extreme position has been adopted by Maccoby (1978) who concluded that "From the moment of a child's birth, it is biologically mandated that a system of interaction will develop between the child and the adult responsible for its care" (p. 1).

The concept of pre-adaptedness draws attention to the evolutionary preparedness of human infants for the ecological niche into which they are born. There is certainly considerable evidence indicating that the infant sensory system is functional at birth and particularly attuned to the stimulation emitted by other human beings (Macfarlane, 1977; McGurk, 1974). Schaffer (1979) concludes that the infant is "equipped with structures that ensure a basic compatibility between himself and his caretakers" (p. 284). As a result, it is now widely held that the infant "has all the basic equipment he requires to begin to engage in face to face interpersonal communication--initially of a non-verbal kind--right from birth" (Newson, 1977, p. 49).

This is not to suggest, however, that human behaviour is pre-programmed. Even though such a position has been attractive to some theorists, a notion of complete pre-programming would fly in the face of the evidence of human adaptability (Barnett, 1973). More seriously, it does not take sufficient account of the fact that the sensory bases of the infant's participation in interaction undergo rapid developmental changes in infancy, changes that should be reflected in the developing interaction. As Schaffer (1971) has argued "The nature of the cognitive structure, in the sense of the total system of an individual's information processing strategies, differs with age and thus sets limits on the kinds of social behaviour that one can expect at various stages of development" (p. 247). The first year of post-natal life is marked by major changes in the infant nervous system; changes which set clear constraints on the infant's behaviour (Kagan, Kearsley & Zelazo, 1978). The infant's capacity to perceive and explore the world also changes dramatically in infancy producing a concomitant shift in interest from proximal to distal stimuli (Bell, 1974).

Also of importance for the present discussion are the changes in the mother's behaviour in the first year of her infant's life. Moss (1967) has suggested that the changes in the mother's behaviour in the first three months following the birth of her infant" . . . probably are largely a function of the maturation of various characteristics of the infant" (p. 25).

However, he recognised that changes are also wrought by "the increased confidence of the mother, her greater familiarity with her infant, and her developing attachment to him . . . " (p. 25).

The changing nature of the relationship between parent and infant has been clearly recognised by a number of authors (e.g., Cairns, 1977 and Maccoby, 1978). In Maccoby's words "A parent-child relationship cannot remain static. The forces of change within a child are too great for that" (p. 6, emphasis added).

There is still much to be learned about the courses of parent-child relationships. The changes in metaphors and models discussed in this paper have engendered new approaches to the study of the social behaviour of mothers and infants. These new approaches have, in turn, had a major impact upon both our understanding of social development, and the role of social processes in the development of the cognitive, communicative and affective capacities of children. Ultimately, such knowledge will further influence the design and implementation of developmental programs, not only in educational settings, but in the home, hospital or clinic and wherever young children with special developmental needs are to be found.

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DEVELOPING LANGUAGE IN YOUNG DISABLED CHILDREN

BY

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Within the history of special education approaches to language development, there have been two competing "meta-theories" about how language development for disabled children is best managed. By and large, one or other of two approaches has been adopted. On the one hand, it has been considered that the language disabled child's problem is such that he needs special procedures and techniques to overcome the problems which he has in language learning. There is a long history of that approach, ranging from such special "prostheses" as the Fitzgerald Key and the Barry Five Slate System (Moores, 1978) in education of the deaf to DISTAR which is used in both special and general education.

On the other hand, there has been an approach which takes the that if one approximates as closely as possible the normal processes and circumstances of language acquisition then one will be doing the optimum for the disabled child, even though his disability may impose some problems for his learning.

In general, the position that we are putting forward in this paper is the second of these: that, as a general theory of development of disabled children, if one can determine and adhere to the normal processes of language acquisition then one will be providing the optimum conditions for the disabled language learner.

What is meant, then, by "normal language development"? Firstly, it can be said that normal language development means that the language of the child should be "age-appropriate" in form, content and function. Secondly, recent theory implies that there are epigenetic stages in language development : each stage grows out of preceeding stages and later learning will not take place as efficiently (if at all) unless these earlier stages have been proceeded through. Thirdly, there is the notion of development of competence in communication. Fourthly, we think that content and function in language are almost inseparable and precede form, both proximally (as regards what the child is saying at any given moment) and also distally, in that epigenetic process of development mentioned above. This last has been very well summed up in the theorem of Slobin (1973) which says that " New forms first express old functions and new functions are first expressed in old forms (p.184)". We will come back to that notion several times through this paper, as it has strong implications for development of communication in language disabled children. McLean and Snyder-McLean (1978) express a very similar notion when they say, "Language is first acquired as a means of achieving already existing communication functions. These preverbal functions seem to be directly related to the functional or pragmatic aspect of later language (p.78)."

Preverbal communicative functions seem to be related to the functional uses of later language and therefore we need to draw the important distinction between communication and language. Language is required for verbal communication and has its roots in preverbal precursors of language which need to be taken into account in any epigenetic theory of language development.

Let us look, then, at the three aspects of language: the <u>form</u>, the <u>content</u>, and the <u>function</u>.

<u>Form</u> we will say little about in this paper. It can be taken,

for most purposes, to mean the "surface structure" of the utterance (both syntactically and phonologically).

As far as content is concerned, it is, in general terms, what is talked about by the individual communicating and involves relationships among the entities referred to. Probably function is the most important thing that should be stressed, because we believe there is a balance which needs to be redressed as far as the relationship between form and function is concerned; the functional aspects of language use are, perhaps, even more important than the form in which they are expressed. The functional aspect of language is best summed up as being "the purposes to which language is put or the purposes for which it is being used". McLean and Snyder-McLean (1978) point out that it is not enough to have form: "in order for a child to use language the child must have not only something to say (content) and a way to say it (form) but also a reason to say it (p. 48)... Language is acquired because, and only if, the child has a reason to talk (p. 78)".

All too often, programmes which have been used in developing language in disabled children have concentrated on giving the child something to say and the form in which to say it, without giving the child a reason for saying it. The linguistically competent child must learn all three of these aspects of language: he must learn the functions of language (and it will be argued that functions are epigenetically prior to standard form); he must learn content (he must have something to talk about); and he must also come to use the normal standard forms of the language.

Given that these are the kinds of things that normally developing infants need to learn and do learn, one can ask, "How does the normally developing infant learn these things?"

Function, we would argue, can only be learned in meaningful authentic settings (Power, 1981). Epigenetically, function's earliest expressions are not in verbal terms but in vocal and manual "gestures" and other "body acts" used to achieve goals, used as instruments for getting what one wants in the way that Halliday (1975) has talked about. He proposes that "Nigel's" first attempts at communication were in gesture and vocal (non-verbal) means and Piaget (1926) similarly talks about the "instrumental use" of gesture. Function can only be learned by the child's engagement in communicative acts with responsive others, and as Byers and Byers (1972) have said

> Learning skilled performances and accumulating knowledge are not substitutes for acquiring competence in managing human relations. When this is applied to the education of children, we believe that the only way communication is learned is through the full involvement of the adult, the parent, or the teacher, with the child. To talk to, to read to, to lecture at - these are not participation. They are not at all communication involvement. They are performances by adults for children. In order for a child to acquire competence in the full range of human communication, some adults in his world must "take him seriously" in direct human involvement. Only then can a child begin to imitate adult communication behaviour and learn it through the process of corrective feedback. Only then can a child discover meaning and values in the messages and subject matter he is being taught and only then can he discover himself in the world of people (p. 29).

This accurately summarizes the relationship between form, function, and content in language learning, and for disabled language learners, as for others, function is primary, and form and content grow out of the need to express one's self about something in one's world. Bruner (1975) and others have suggested what the preverbal precursors to the kinds of communicative interaction we're talking about may be like; the child, in a sense, is able to learn language because he has already learned conversational interaction skills, "one person has the speaking turn at a time"; "listen when the other person speaks"; "speak when the other person isn't speaking", and so forth. These are all learned skills. They are not ones that the infant has "built-in" and these kinds of learnings take place in non-verbal modes some months before recognisable verbal language begins to emerge.

It is an interesting question in this context to ask why language proceeds to higher and more complex levels at all? Brown (1973) has pointed out in an interesting passage that very often the small infant's cries, gurgles, glugs, shrugs, tugs and pulls will get him most of the things that he wants. Brown says that we don't <u>really</u> know why the child proceeds to higher levels of complexity of language when relatively more primitive forms will usually get what he wants.

We don't think it's quite that obscure. Bruner (1980), as so often, has a delightful phrase for this process. He says that the reason why children proceed to higher levels of complexity is that mother "ups the ante". She pushes the child along towards more complex language <u>when she feels that he is capable</u>. In many ways, we think that the task for us as teachers and clinicians working with the disabled language learner is to know when to "up the ante". It is a very difficult business. It is a difficult task for a teacher of the deaf or a teacher of the intellectually handicapped or a teacher of any other disabled

language learner to be able to keep that nice distance ahead, appropriately upping the ante. We seem to have a very good set of acquired skills as far as ordinary children are concerned and we are able to automatically up the ante at the right moment and keep that nice distance ahead. One of the most difficult tasks we face in special education settings is to up the ante to just the right level at the right time, because that gap between performance and age with the disabled language learner seems to throw us off course. Experience and intuition suggest that there are rules that apply to upping the ante, but it is something that urgently requires research.

We would see this upping the ante in order to extend the complexity of the child's language skills as being central to normal language acquisition and also for the language acquisition of disabled learners.

It becomes an important question to ask how does the mother decide when an utterance is acceptable or not, and how does she decide whether she should up the ante at this particular time. The phrase that is used often in the literature in this regard is that mother is "tuned" to the child's utterances; tuned to the extent that she unconsciously monitors the balance of content, function, and form in the child's utterances and if, for example, she feels that in a particular child utterance both content and function are well established, she may then encourage (in ways that we'll examine later) the child to use a more complex form. When the mother is confident that the child has the function under control she is not averse to putting some pressure on the child to improve the complexity and level of the forms in which he expresses that function. When she feels that the child has not yet got that function under control, she will not demand higher levels of correctness of form. Again, that is something that we have not handled well as far as the disabled language learner is concerned; we have been too concerned with form at the

expense of the development of functions. We are probably all familiar with that literature which indicates that if one does concentrate on form too soon, too early, one gets that "impenetrability of grammar" that David McNeil (1970) has talked about; that famous exchange which is often quoted in which a child comes to mother and says:

Child Nobody don't like me

Mother No, say "nobody likes me"

Child Nobody don't like me

.
.
.

(eight repetitions of this dialogue)

.
.
.

Mother No, now listen carefully:
say "nobody likes me"

Child Oh! Nobody don't likes me (p. 106).

McNeil thought that impenetrability of grammar made "correction" ineffective unless the child's pre-existing rules were ready to accept change.

Well, how does the mother go about obtaining a higher level of contribution from the child? Most naive mothers (naive in the sense of not having had any linguistic or psycholinguistic training) we now know well from the literature, do not go around correcting their children. In fact, it is becoming very clear from the literature that direction and correction of children's language may be entirely counter-productive and we think there

are lessons for us, as special educators, to learn from that literature. Nelson (1973), for example, has shown that during the early stages of language development, direction is counter-productive. She says, "Active control and premature differential enforcement retards rather than advances progress. It is the generally accepting mother who appears to be most facilitative; selective responding, for example, correcting early errors is unproductive (p. 113)". Similarly, Bruner (1975) observes that correction may inhibit the child's development of the language and not improve it, "it is often the case that mother's correction of a 'mismatch' inhibits the interchange (p. 15)". You may recall that UNESCO once asked a number of outstanding child development theorists to write a book expressing their views on how child development proceeds. The book that Piaget (1973) wrote in answer to that commission was called To Understand is to Invent, and there is a clear indication right throughout Piagetian theory that one must, as it were, invent one's world -- in our context, invent one's language anew for oneself. The child must come to, and formulate, his own rules and not have them imposed upon him. Bowerman (1978) says a similar kind of thing in talking about a language training session in a special education context, "In the typical language training session the therapist continually directs the child's attention and asks him to focus on certain materials, whether they happen to capture his interest at the moment or not. In addition, she provides constant feedback on the accuracy of his performance. These are exactly the kinds of interruptions that appear to be the least conducive for language development... (p. 174; stress added)". We feel that there are quite clear implications for the inappropriateness of the more directive and "constructivist" (Van Uden, 1978; 285.) approaches to language teaching as far as that kind of research evidence is concerned. Mothers obtain the language that they feel the child is capable of by the quality and nature of their responses to the child in conversation. Maternal responses act as feedback to the child

regarding the effectiveness and correctness of his contribution. This feedback operates in and through the dialogue and does not have any metalinguistic character. We will not take the time this afternoon to develop the notions of expansion, expatiation, modelling and the other kinds of interactive conversational aspects of language development that are now well established in the literature (Power, 1975; Snow and Ferguson, 1977.)

Via these processes, the child's language develops normally, but implicit in all of this is that both parties in the language development task (mother and infant in the paradigm case) need to be competent partners. They both need to be able to bring something to the language learning task, and if either of them is "incompetent", then the process of language learning may not proceed normally. (We won't be too concerned with the "incompetent" mother, although obviously some mothers are much better than others at raising the ante, thus developing the child's language and increasing his communicative skills. In any setting, in the regular school, in special education, or in the early intervention setting in particular, the mother's skills are something that one needs to be very concerned with and constitute a set of problems of their own. We are just going to remind ourselves that these problems exist, and then pass over them. We want to concentrate this afternoon on the child as one of the incompetent partners.)

Cross and her Melbourne group (see the paper in this volume) have been working for some time now with language-delayed children and their mothers, and hearing-impaired children and their mothers, and she goes so far as to speak of the incompetent child producing a "crippled communication dyad". Thus, the kinds of interactive difficulties that occur for these children in language learning may be a downward spiral, so that as the child becomes less and less competent vis-a-vis his age mates, so the mother becomes less and less competent to deal with his

decreasing rate of growth of competence. The effect of this may "maintain" the child's language disability (Bloom and Lahey, 1978). An essential task of early intervention in language, and in general social and cognitive development as well, is to prevent this crippling maintaining effect in the communication dyad when the child has what Bloom and Lahey call a "precipitating condition" for a language disorder. Whether that precipitating condition is hearing impairment, brain damage, moderate or severe mental retardation, cerebral palsy, or some other cause, how can deleterious outcomes of interaction (maintaining factors) be prevented? The very interaction between mother and the language disabled learner may result in environmental conditions that maintain and exacerbate the problems that already exist.

We think that to gain some insight into answers to that question, we need to look at the whole notion of "incompetence". What does it mean to say that a child is incompetent? It is quite clear that all children are incompetent linguistically when compared with adults; decreasingly so as they develop more and more closely towards standard adult levels. Some children are incompetent when compared with their age peers and that comes back to the notion of "age-appropriateness" with which we introduced this paper. At some point on that continuum of incompetence this non-equivalence with age-peer development becomes a "language disability".

Incompetence may well be an outcome of unsuccessful interactions between the child and his environment. Early intervention can thus be seen as the provision of an environment which will maximize the child's competence.

As intervention is the provision of an environment which will facilitate or maximize the child's competence, it is, then, a reasonable question to ask how we recognize the "competence facilitating environment". As yet, we have very few measures of what one might call the "proximal" characteristics of that environment; we have not yet got very many good measures of whether what one has just said to an infant was facilitating or not. However, the characteristics of the normal environment are becoming clearer, (Snow and Ferguson, 1978; Waterson and Snow, 1978; Nelson, 1973; Cross, in this volume). This literature has now become quite large and we are increasing our knowledge of the characteristics of the normal environment. There are descriptions now available of the kind of interactions that normally take place between infants and mothers, and as these become clearer we may be able to develop from them some measures of the adequacy of a linguisitic environment. Many of us who are experienced clinicians or teachers may believe that we have a good "feel" for a facilitating environment, but those of us who have been placed in the situation of advising mothers on how to go about facilitating the language and communication of their children feel very much at a loss as to what exactly to say to a mother about what she should do in a particular interaction.

In a broader sense, as far as the "distal" characteristics of the linguistic environment are concerned, we do have simple measures, and we will come back to talk about some of these below.

Another central issue we want to address, and one that is still unresolved, is whether we should provide normal conditions for the "abnormal" child, or whether the presence of an abnormal child necessitates the provision of an abnormal language environment. This comes back to what was noted above : the notion that there are competing theories as to whether the environment needs to be changed because of the child's precipitating disabling condition, or whether an environment as

close as possible to the normal language learning environment will be the optimum environment also for the language disabled child. It is our belief that if one gets as close as one possibly can to the normal environment, and the characteristics of the normal environment, one is providing the optimum for many disabled language learners. We are not among those who would say that all communicative disorders share the same basis and that there are across-the-board general principles of remediating learning disabilities. We think that it does make a difference as to whether the precipitating condition is severe intellectual handicap or hearing impairment (without additional intellectual handicap) and that it may not be advisable to seek one single approach for children with language learning problems.

At the same time, we think that some general principles may be applicable to specific cases. One proposal that might be put forward in this area is what we call "The Principle of Minimal Change", and we think that this is one we need to consider in special education settings. The Principle of Minimal Change implies that we should change the environment of the disabled language learner only as much as is absolutely necessary, leaving other aspects as unchanged as possible. What does that mean? Let us give you an example from our own field which is education of the hearing-impaired. We obviously cannot here address all of the arguments in favour of introducing Total Communication, a manual supplement to oral education, for significantly hearing -impaired children, but we think a good example of the Principle of Minimal Change is the necessity, as we would see it, to introduce Total Communication to a significantly hearing-impaired child from the age of diagnosis. In doing that, one in a sense "abnormalizes" the environment by introducing to the significantly hearing - impaired child a quite obviously "abnormal" method of communication. However, the provision of this communication method allows mother and infant to more easily meaningfully interact, one with the other. It seems unnecessary,

for example, to exhort the mother to "imitate" the child's attempts at communication since such maternal behaviour may well interfere with the natural process of interaction. Thus one doesn't want to change the kinds of interactions that mothers have with hearing-impaired infants, and traditional guidance procedures have done just that. (It might be noted at this juncture that some of the most linguistically competent deaf children are those of hearing-impaired parents). We have tended to sit mothers down with two-year-olds, three-year-olds and four-year-olds and have them doing quite formal lessons with the speech trainer on the table, and so forth. Those procedures abnormalize the "interaction" environment. Change only what is necessary (in this case, add signing and fingerspelling to the communication matrix) in order to be able to retain the interactions that are crucial to language development.

We would argue that in many of the more structuralist and behaviourist programs that we have used and are using, there is a danger that these programs change too many aspects of the interactive process so that the situation becomes too deviant, too different. This will, therefore, lead to non-authenticity of the language learning environment (Power, 1981) and produce just those maintaining conditions that Bloom and Lahey (1978) refer to. These conditions institutionalise the precipitating condition and lead to the deviant language and social behaviours which have been noted with many handicapped groups; with handicap becoming, as it were, a way of life.

Another general epigenetic principle that we need to consider is that programming for language development must go back before the development of words. To follow normal developmental stages as closely as possible, and in particular to ensure the child's authentic involvement in his language learning situation, the child must be allowed to lead and the mother must be willing to follow. There is research evidence that the younger the child

and the less competent the child is, the more the mother follows him, rather than vice versa. The older the child and the more competent the child, the freer mother feels to lead him, because she can be reasonably confident that he will be able to follow. When she knows through that process of feedback that is continually going on between mother and infant, that he is not yet competent, she follows him.

If one thinks that function is a central aspect that needs to be developed in children, one could reasonably ask what the targets should be as far as teaching is concerned. In this regard, there are categorizations available, from relatively simple ones like that of Halliday (1975) to the more complex functions outlined by Tough (1977); summarized well by McLean and Snyder-McLean (1978).

As far as what emphasis should be placed upon the development of language forms, the Epigenetic Principle offers another generalisation : the forms expected of a child should be <u>age- and environment-appropriate</u>. The literature and our own experience indicate that children do not immediately use standard forms, but gradually approach them through stages formed from their approximations and feedback from the linguistic environment. We do not expect mature terms from ordinary children immediately, nor should we expect them from the language disabled child of the same age (indeed, because of his "precipitating condition" we should give him considerable age leeway in development of form).

A principle that is often overlooked, particularly with more severely disabled children, is that form need only be "environment-appropriate". By this we mean that not all children should be expected to develop all standard forms. An experienced judgement needs to be made as to the likely demands of the child's future environment as far as language is concerned, and developmental demands for formal correctness based upon that. A

pressing research need in this area is to examine the demands of the "daily round" of disabled people to enable us to set realistically achievable and necessary goals for their curricula (in many areas other than language also; Power, 1981). (One must be careful, of course, to continually review these expectations in order to keep them as appropriate as possible.)

Let us summarise by saying that four principles seem to us to emerge from the recent language literature and research:

(i) The Epigenetic Principle: we need to follow a normal developmental line and look back on the stages of normal development in order to determine what are appropriate levels and stages of developmental language to expect of the disabled child.

(ii) The Principle of Minimal Change: as far as possible we would introduce only those changes which are absolutely necessary into a language learning environment in order to normalise and maintain the normality of that language learning environment.

(iii) The Principle of Age- and Environment-Appropriate Form Demands: expectations of the level of form demanded of the child should be realistically attuned to his capacities, age and living environment.

(iv) The Principle of Maternal Following: which says that the mother should follow the lead of the younger and/or less competent child in order to be sure that meaningful communication is taking place.

Let us finish by quoting Brown (1977), who, as so often, expresses well what all this amounts to:

> 'How can a concerned mother facilitate her child's learning of language?' My answer ... is as follows: 'Believe that your child can understand more than he or she can say, and seek, above all, to communicate. To understand and be understood. To keep your minds fixed on the same target. In doing that, you will, without thinking about it, make 100 or maybe 1000 alterations in your speech and action. Do not try to practise them as such. There is no set of rules of how to talk to a child that can even approach what you unconsciously know. If you concentrate on communicating, everything else will follow (p. 26)'.

This is the attitude and practice that we need to be inducing in mothers of children with language-learning problems in order to maximize the opportunities of those children to learn to communicate.

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RESEARCH ON MOTHERS INTERACTING WITH HEARING-IMPAIRED CHILDREN*

by

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Research over the past decade has taught us much about the way adults and older children talk to younger children during the early stages of first language learning. It is now commonplace to find in the literature on child language development discussions about the syntactic, vocabulary, discourse and speech-style adjustments that parents make when addressing young children. Many articles also indulge in speculations about the role such adjustments play in promoting language learning; while others, less frequently, report manipulative research designed to assess the impact of variation of specific parental speech features on aspects of their children's development.

Following rather slowly behind this interest in the speech of parents to children developing language in normal fashion, there are now signs of an upsurge of interest in the language parents use to children who are communicatively impaired in some way.

At the First National (American) Symposium on Disorders in Language Development, held in Madison, Wisconsin last June, there were three papers examining the speech of parents to children with specific language

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impairments and others concerned with parental speech to mentally-retarded and autistic children. Several papers have been published investigating parental conversations to Down's Syndrome children, and I know of similar work which is about to be commenced with blind children.

I think it is much to the credit of clinicians and educators of hearing-impaired children that their concern with parent guidance has led to an earlier interest in comparing parents of hearing and hearing-impaired children on similar language and speech variables, which means that we now have a more complete picture of parent-child interaction with hearing-impaired children than for any other area of handicap in development. This is not to say that we are in possession of enough details to put parent guidance programmes onto a solid empirical footing. It is still the case that research into the linguistic experiences of hearing children has far outstripped that for the hearing-impaired - especially in terms of the study of the pre-linguistic phases of development; and one can still bemoan the fact that there are far too few published comparisons of speech used to hearing-impaired and hearing children of the same ages and stages, and too little research which takes into account the effect of both the hearing-impaired child's hearing deficit and his/her communicative impairment on the parent's interaction style.

Let us review the major research in this area. Greenstein, Greenstein, McConville and Stellini (1976) conducted a longitudinal study of thirty hearing-impaired children between the ages of one and three years. They concluded that the affective elements of mother-child interaction were most closely associated with the children's language abilities. As Kirkman (1980) in a review of such studies points out, their results highlight "the interdependent effects of maternal acceptance of the child, early intervention, and child communicative ability" (p. 46). She further notes that the affective aspects take on significance beyond the usual parent-child relationship because of the special impact of a handicapped child on the relationship.

Most studies of parental speech to young hearing-impaired children reflect this special impact. For instance, Goss (1970) concluded that, in comparison with hearing children, mothers of hearing-impaired children praised their children less frequently and showed more verbal hostility.

Two studies (Weddel-Monnig and Westerman, 1977 and Morris, 1978) indicate that mothers of hearing-impaired children make fewer adjustments in their language over development; while two others (Gregory, Mogford and Bishop, 1979 and Mogford, Gregory and Keay, 1979) suggest that their speech actually becomes less, rather than more, complex as their children grew older. On the other hand, Anderson (1979) has concluded that maternal speech to hearing and hearing-impaired children was "strikingly similar" (p. 241). However, Anderson's comparison was not direct; the hearing sample was borrowed from Snow's (1977) report of only two children, and she herself used only three hearing-impaired children for whom the ages and stages of development were not well-matched. A further problem is noted by Nienhuys (personal communication) who points out that Anderson's categories were very general and do not permit valid comparison with other studies.

However, as Kirkman argues, the results of most studies are consistent with a conclusion drawn by Gregory (1976) who reported that mothers often states that it was pointless to converse with a child with severe hearing impairment. Kirkman concludes from her review of such studies that conversation between hearing-impaired children and their mothers does not appear to follow normal developmental trends, since it does not occur naturally. She considers that this may account for a finding by Howarth (1976) that increases in the complexity of maternal speech can be observed after the hearing-impaired child has reached school - a finding which is not consonant with the literature on mothers addressing hearing children beyond the age of five or six (e.g., Snow, 1972; Fraser and Roberts, 1975).

The Melbourne studies on speech to hearing-impaired children, in contrast to most of those reported above, have analysed maternal speech in detail in terms of the effects of child age, language production and comprehension, cognitive ability and hearing impairment on maternal conversational adjustments. They have also been systematic in comparing maternal speech to hearing-impaired children of different ages and stages of language ability to the appropriately matched hearing child groups. Much of the work our team (Cross, Nienhuys, Kirkman, Morris and Horsborough) has been doing over the last four or five years has been reported in several publications (e.g., First language, 1980, Proceedings of the International

Congress on Education of the Deaf, 1980, and the Australian Teacher of the Deaf, 1980).

What I propose to do is to summarize the general findings of these studies and then move on to make a first report of some of the more recent work we have completed.

METHOD

For all of our recent analyses and comparisons we have used six groups of mother and child pairs: four groups of ten hearing children and two groups of ten hearing-impaired children and their mothers, sixty pairs (dyads) in all. All the hearing-impaired children had been audiologically tested within three months prior to our contacting them. These children all had current hearing losses in the better ear in excess of 70 dB SPL HL at frequencies 500, 2000 and 4000 Hz. Their aided thresholds exceeded 40 dB over the same frequency range, and the hearing loss was prelinguistic in all cases.

Our four groups of hearing children represent different ages: infants, 3-6 months old (HO), one-year-olds, 10-12 months (H1), two-year-olds, 23-28 months (H2), and five-year-olds, 58-65 months (H5). The two groups of hearing-impaired children were selected to be comparable with the hearing groups in terms of either age, linguistic ability or cognitive ability. They were groups of two-year-olds (D2), 25-33 months, five-year-olds (D5), 55-68 months, respectively. In each group (hearing and hearing-impaired) there were five males and five females.

Our aim was to compare the mothers' spontaneous speech for all groups, recorded in naturalistic play situations, on a large number of measures of maternal speech features. We were particularly concerned to measure the differences in conversational style caused by the differences in age, language ability and hearing status of the child at each of the following levels of analysis: syntax, semantics, discourse structure, speech function, speech style, fluency and conversation structure. Thus for each level of linguistic analysis, we compared the appropriate groups using parametric analysis of variance with planned comparisons.

Before discussing these data, however, it is important to make clear the bases on which the groups were compared:

1. Age. In terms of age, the appropriate hearing-impaired versus hearing-child matches were between the mothers of the hearing-impaired and hearing five-year-olds on the one hand, and the mothers of the hearing-impaired and hearing two-year-olds. Thus, if age is the major influence on maternal conversation style, we would expect mothers of two- and five-year-olds to differ, with no differences between the hearing-impaired and hearing groups in these comparisons.

2. Language. In terms of language ability we used measures of both spontaneous speech complexity and language comprehension. On MLU, speech complexity, we obtained matches between the hearing two-year-olds and hearing-impaired five-year-olds (MLU's of 1.73 and 1.41 respectively). Their scores on vocabulary and comprehension tests were also very similar. We also had a match (though less precise) between the hearing one-year-olds and hearing-impaired two-year-olds, most of whom had not reached the single-word stage. However, their receptive vocabulary and linguistic comprehension test scores were quite similar and low. Thus, we could predict that if child linguistic ability is the major influence of maternal conversation style, there would be no differences in mothers addressing children of similar linguistic abilities.

3. Hearing Status. If, however, hearing impairment itself is a separate (and/or additional) factor in altering the normal adjustment pattern between mother and developing child, then we would expect to find differences between the mother of the hearing-impaired and hearing children despite matches for age or linguistic level.

4. General Aural Receptive Capacity. As a further test of the factor of hearing-impairment, we were able to establish a rank order of receptive abilities which included the group of mothers addressing infants of 3-6 months. In this way, we could also make direct comparisons between mothers' speech to the hearing-impaired children (especially the two-year-olds) and to hearing infants who would not

be expected to have any ability to process language as language, but who could be expected to provide their mothers with feedback as to their abilities to perceive the human voice.

RESULTS

The results of these comparisons are difficult to present clearly because the investigations have, over the years, produced a very large number of comparisons on an even larger number of features. However, I will attempt to summarize them under the headings of the major levels of linguistic analyses.

1. Syntax

(a) Syntactic Complexity. The major pattern of results for the comparison of all six groups was that the syntactic complexity and length of maternal utterances uniformly increased with the age of the hearing children from infancy to five years of age. Thus as hearing children grow older, and more communicatively able, the normal pattern is for their mothers' language to become gradually more complex.

However, it is of interest to note that the pattern for the hearing-impaired groups is dissimilar. Here we tend to get a pattern which neither reflects the age nor the linguistic abilities of the hearing-impaired children. In fact, for almost all of our measures of language complexity, we have found that maternal language to both hearing-impaired groups is at least as simple as (and often simpler than) mothers addressing hearing infants.

We now feel that these results are not difficult to explain. Subsequent and more detailed analyses of the utterances mothers use to hearing-impaired children, particularly the younger ones, have shown that they use greater proportions of single word utterances, labels, repeated verbs and noun phrases, WH words and stereotyped routines or stock expressions than do mothers of one- or two-year-old hearing children. This appears to be a direct response to their perceptions of the consequences to

the child's communicative potential of the serious hearing deficit, and supports Gregory's (1976) conclusion that mothers fail to match their hearing-impaired children's linguistic capacity because, in their view, it seems pointless to converse naturally with a child with a severe hearing impairment. The adjustments they do make seem to be either tutorial - teaching and repeating to the child the names of things and actions - or aimed at filling the conversational gaps by means of ready-to-hand stock expressions delivered in monologue-style.

(b) Sentence Types. The mothers' choices of sentence types also provided interesting differences between the mothers of the hearing-impaired and hearing children. The pattern for the hearing groups for this group of maternal features (shown in Table 2) is not generally linear. In regard to the hearing-impaired child-mother groups, the unusual patterns are in the mothers' clear failure to match the child's linguistic or age level in the incidence of tagged declaratives and ellipitical utterances in both the D2 group and the D5 group (although an age-matched result is obtained in the D5 group for ellipsis). However, it is generally evident that in choice of sentence-type, the mothers of the hearing-impaired children show that they are capable of adjusting their language in much the same way as mothers of hearing children. This pattern of resemblance to the hearing groups is continued for the sentence fragments (Table 3). This again suggests that these mothers do respond to their child's language level at least in general terms. It is important to note, however, that there are several small but reliable differences between the age and language-matched comparisons with the hearing groups. This suggests to us that, although the hearing-impaired groups' mothers are able to make generally similar adjustments, they are not able to fine-tune these adjustments as closely to their children's actual measured linguistic performance as the hearing-group mothers.

I would like to also draw your attention in Table 3 to the

deviation for the hearing-impaired group in the incidence of Wh phrases. These are relatively depressed for the D2 mothers and considerably heightened for the D5's, which also reflects the pattern for complete Wh questions. Analysis of the transcripts showed that this was due in the D2's case to a reduction in questions for information purposes - genuine as against rhetorical questions; and in the D5 case, we noted a high frequency of "What's that?" style of question, typical of the "naming game" played by mothers of hearing prelinguistic toddlers, but in substantially increased numbers. We feel that this may reflect a tutorial device adopted by mothers of older hearing-impaired children possibly in response to advice from parent guidance sources.

2. Stereotyped Utterances

A sizeable proportion of maternal speech has been shown to consist of routine, frequently repeated stereotyped phrases. In our investigations this represented a category of maternal speech features in which there was a general tendency for the hearing-impaired groups' mothers to differ substantially from the appropriate hearing groups. As Table 4 shows, the main differences were found in the use of idiomatic imperatives (e.g., Come on, Wait on, Come here), for the D5's, in the high proportion of idioms overall, and in the much increased use of "Look" and "See" attentionals for the D2 group.

The D5 differences are consistent with the conclusion that the mothers are responding to the "gaps" in the conversation, caused by the older hearing-impaired child's deficits as a conversational initiator, by resorting to well-tried idioms to carry the conversation. In this case, it can be clearly seen that they resemble the mothers of the hearing infants. On the other hand, the pattern for the younger D2 group suggests a more direct response to the child's receptive handicap. The inflated use of attentionals, far beyond the level used to hearing infants and toddlers, is indicative of a strongly perceived need to keep drawing the child back into the conversation and to constantly keep

his/her attention focussed on the mother's activities and utterances.

3. Other Utterance Types

Table 5 contains data on the incidence of utterance types which are rarely found in normal adult speech, but which reach significant proportions in the speech of mothers to infants - vocatives, greetings, action routines and semantically-empty utterances (proposition-free). The hearing-groups data in Table 6 show a predictable and clear tendency for these utterances to decrease as the infant reaches the stage of using language (i.e., at the H2 level) and to disappear from the speech of mothers addressing five-year-olds. There is a rapid trend for parental speech to approach the normal adult style in these features. However, the hearing-impaired data, especially for the D2 group, although following this trend, does so much more slowly. Moreover, it is clear that for some features, there are frequencies in the D2 group which are too low for the linguistic hearing match - greetings and action routines - or too high - vocatives. We feel that these differences are directly attributable to the special difficulties of interacting with young hearing-impaired children. The higher incidence of vocatives reflects the pattern for attentionals and imperatives, and seems to be caused by frequent attempts to maintain the child's attention to both the conversation and the play-affectionate quality in the interaction, since this is the role they seem to play in the hearing interactions between mothers and infants. The reduction in action routines, we feel, can be explained by reference to the video-tapes which showed fewer interchanges where the hearing-impaired mothers actively participated in child-centred play activities. This would, of course, provide fewer opportunities than for the hearing infants for the mother to accompany the child's (or her own) actions with appropriate words or phrases.

4. Discourse Features

The discourse features I have selected to discuss (see Table 6) are those for which there has been much debate and discussion in the hearing literature about their usefulness in promoting syntactic

acquisition and clarifying the meaning of adult speech to their children. The patterns of difference here for the mothers of the hearing-impaired children are quite marked. They too generally indicate a strong tendency for the mothers to carry a larger proportion of the conversational burden than occurs for the comparable hearing comparisons.

Table 6 also shows that although the D2 mothers tailor their tendency to repeat themselves to the child's language level (as shown by comparison with the H1 hearing match), the D5 mothers keep up a rate of repetitions much higher than their H2 counterparts. In contrast, expansions and imitations (measures of the tendency to repeat what the child was attempting to communicate) are considerably reduced for the D2 mothers - almost to the level of the non-linguistic hearing infant group.

This pattern seems to be a result of two factors: firstly, the mother's difficulty in comprehending what the child intended to say and, secondly, what seems to be a less intensively child-centred approach to parent-child conversations.

The higher prevalence of self-answers for both hearing-impaired groups seems to be another, and clearer, indicator of the mothers' tendency to fill the gaps in the conversation by resorting to a "two-part" monologue-style.

We feel that this Table presents a pattern of results which should give pause to those who would wish to assist parents in promoting language development in hearing-impaired children. On the one hand, we can show that some classes of spontaneous tutorial devices are over-used and, on the other, that others are under-used, in comparison with the hearing groups. Both situations appear to us to be different facets of an understandable response to the same communicative problem in the child. Invervention in remedying one deviation may result in unwanted depression of the other in natural conversational situations.

5. Speech Style Variables

The results of our analyses of the normal developmental trends in speech-style variables are, like the complexity measures, very regular indeed. The overall hearing pattern clearly indicates a strong trend towards increasing degradation in speech style (i.e., a trend towards more adult-like relaxed speech) with increments in the hearing child's maturity - in both age and linguistic ability. At the same time, there is a similar developmental trend towards relinquishing single-word utterances and incomplete sentences as the hearing children mature, and this is also a trend towards normal, conversational, adult speech characteristics.

The hearing-impaired maternal groups deviate markedly from these trends, especially if we consider them to be adjusted to child linguistic maturity (rather than simply to age) as in the hearing samples. Their mothers use significantly more sentences that are run together and not separated by pauses. This suggests a carelessness in monitoring the child's limited ability to process a deal of linguistic information at any given time. However, this is directly contradicted by the other findings in Table 7. They also use fewer disfluent utterances than their hearing-group counterparts, fewer degraded utterances in total, fewer incomplete sentences, fewer grammatically unacceptable utterances, but many more single-word utterances than would be predicted from the hearing data.

All these latter results suggest, in contrast, a very conscientious monitoring of the perceptibility and salience of their speech to their children, as well as some attention to its processability as language input. Such a degree of monitoring would appear to be unnatural for the mothers of hearing children and verifies the somewhat strained nature of their conversations reported by our observers. However, given the nature of their partner's hearing impairment, this too is an understandable adaptation. I believe it would be difficult to justify intervention to "normalise" this aspect of their conversations (with the possible exception of single-word usage) without a great deal more knowledge than we have at present about the appropriate ways to minimize distortion of the speech signal to such children.

6. Functional Code

At a later date, in an independent analysis conducted by Kirkman at the University of Melbourne, we adapted a functional code developed by Dore, Gearhart and Newman (1978) which differentiated at three hierarchically arranged levels approximately forty speech acts. We applied this speech act code to five of our six groups, omitting the hearing infant (HO) group. This aspect of the work was undertaken to determine whether the functional level of maternal speech (the underlying communicative purposes for which language is used) would also be responsive to the linguistic abilities of the children and reflect patterns similar to those we had found for the surface structural and discourse analyses.

Table 8 provides a summary of the data for the first two levels of this hierarchical code, omitting the more detailed data at the individual speech act level which showed similar but more pronounced trends.

In summary, the data for the hearing groups showed differences between all the age groups in measures of both mother and child communication. The fact that the most marked differences were discernible between the mothers of the pre-lingual one-year-olds and the mothers of the two-year-olds encourages the inference that the acquisition of formal aspects of language strongly affected maternal conversation.

This result matched our analyses of syntax and discourse features, suggesting that adjustments are made to many facets of adult speech to children. It also demonstrated the sensitivity of the conversational act code to variations in mother-child interaction, and showed further that it was appropriate for use with non-verbal children.

Hence, we moved on to a second study which was designed to extend the first by investigating whether mothers of hearing-impaired children use a similar conversational style when compared with mothers of hearing children, and whether any similarity is related to the age or linguistic ability of the child. Additionally it was proposed to

assess whether the nature of the interaction was likely to be helpful to the hearing-impaired child's acquisition of language. Thus, we included our two groups of hearing-impaired children and their mothers in the second comparative analysis.

The results of this study, summarized very briefly in Table 8, indicated that the linguistic ability of the child (the H2 + H5 vs D2 + D5 column) is of greater importance to maternal conversation style than the child's chronological age. However, several anomalies in the speech of mothers to the younger hearing-impaired children (as in the syntactic analyses) hinted at the severe communicative difficulties inherent in, firstly, the child's hearing-impairment (that is, his/her receptive handicap) and, secondly, in parental attitudes to the handicap. The mothers of the Hearing-Impaired Two's were found to use fewer suggestions and certain kinds of regulative functions and assertions. On the other hand, they were found to use significantly more assertions about perceivable phenomena and many more attention-getters. Both hearing-impaired groups deviated in terms of the higher use of protests or warnings, self-answers and speech to solicit control of others. Most of these differences could be best explained as fairly direct consequences of interacting with a child who is unable to attend to, and easily comprehend, what the mothers were saying. As in the previous analyses, there were some indications that both mother and child, as a result of such experiences, were tending to opt out of a genuine conversational situation in favour of one in which the mother sometimes adopted a monologue style.

CONCLUSIONS

In summing up our results for the hearing mother-child groups, it seems reasonable to conclude that the developmental trends in normal parent-child conversational interaction indicate that parents are sensitive to, and respond linguistically to, feedback from their children's increasing communicative capabilities. This feedback often seems to be provided by the child's ability to produce evidence of comprehending individual parental utterances. However, despite the fact that we would want to give a primary role to the child's level of comprehension, there are

indications in our "hearing" data that other facets of the child as a conversation partner also affect the parent's linguistic choices. Some changes over time seem to be directly related to improvements in the infants' attentional capacities - such as the decrease in attentionals, vocatives, etc.; others are more directly associated with advances in motoric development which introduce an element of linguistic control into the interaction and, hence, the frequent use of the imperative form. Still other features, e.g., greetings, endearments, social routines, interjections, and (to a certain extent) idioms, seem to highlight the affective tone of mother-infant interaction and decrease as the need for control and information-sharing is introduced into the interaction by the child's maturation. In this sense we are proposing a multi-factor account as a complete explanation of the changes that take place in a number of levels of analysis during the hearing child's development.

The main difference that we can see between the adjustments in the conversations of parents of hearing and hearing-impaired children are concerned with (a) fine-tuning, (b) developmental direction, and (c) sensitivity to the child's actual and potential linguistic ability. These differences are most marked for the younger hearing-impaired child group, and appear to become gradually less so as the hearing-impaired child matures. However, as you will no doubt have concluded yourselves, even at age five there are still clear signs that the hearing-impaired child's mother, influenced by the extent of his/her communicative handicap, is failing in some important respects to adjust her language and speech style to her child's linguistic ability. Whether it is wise to counsel intervention to bring her adjustment into line with the mothers of hearing children of either similar linguistic abilities or age is still an open question. Before we can answer it, we must be able to answer several others first, including the crucial question of whether the mere fact of deviance from mothers of hearing children constitutes a prima facie reason for intervening to "normalize" the interaction styles of mothers of hearing-impaired children. We have yet to obtain a clear answer to the question of whether some of the special adjustments of these mothers are specifically made to compensate for their children's hearing deficits. We have just commenced the type of research which may tell us what maternal adjustments lead to superior language in hearing-impaired children. The answers we obtain from this latter project should place us in a better position to advise professionals attempting to guide parents in this aspect of their interactions.

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TABLE 1

Complexity and Length Measures

Mothers' Speech Variables - Means

Mother Groups	Rich Complexity	Standard Complexity	Sentence Complexity	M.L.U.	M.M.L.U.
H0	0.91	0.82	1.21	4.00	9.83
H1	1.03	0.81	1.21	5.50	10.16
H2	1.11	0.96	1.27	4.96	11.06
H5	1.15	1.10	1.35	5.71	11.81
D2	0.95	0.80	1.14	3.60	8.52
D5	1.00	0.81	1.12	4.19	9.60
Significant Differences:		H1-H2*			
	H2-D2≠	H2-D2**	H2-D2**	H2-D2**	H2-D2**
		H2-D5≠	H2-D5**	H2-D5**	
	H5-D5*	H5-D5**	H5-D5**	H5-D5***	H5-D5***

≠ p<.10
* p<.05
** p<.01
*** p<.001

TABLE 2

Sentence Types

Mother Groups	Y/N Quest.	Wh Quest.	Declarative	Declarative ≠ Tag	Deixis	Imperative	Elliptical
H0	15.11	11.75	17.46	4.47	1.60	9.51	3.06
H1	8.18	9.12	17.02	5.67	3.81	15.21	0.76
H2	10.10	15.85	22.20	5.25	5.50	9.05	1.50
H5	10.45	12.55	28.40	6.90	4.25	6.25	2.35
D2	9.10	8.10	16.70	2.70	6.40	16.65	1.40
D5	9.65	16.35	19.90	2.30	5.90	9.75	0.85
Significant Differences:	H0-H1*				H0-H1**	H0-H1≠	H0-H1*
	H0-D2≠				H0-D2**	H0-D2*	H0-D2≠
	H0-D5≠	H1-H2**			H0-D5***	H1-H2*	H0-D5**
		H1-D5**		H1-D5≠		H1-D5*	
		H2-D2**	H2-D2≠	H2-D2*		H2-D2*	
				H2-D5*			
			H5-D5**	H5-D5***	H5-D5*	H5-D5*	
	D2-D5***					D2-D5**	

TABLE 3

Sentence Fragments (Propositionally Opaque)

Mothers' Speech Variables (Mean Percentages)

Mother Groups	Noun Phrases	Prepositional Phrases	WH Phrases	Y/N Words
H0	1.90	.40	.16	7.66
H1	4.79	.96	0	4.18
H2	8.90	2.00	.30	8.45
H5	5.20	2.00	.60	11.45
D2	7.75	1.60	.15	3.10
D5	10.85	2.35	2.05	7.00

Significant Differences:	H0-H1**		H0-H1+	H0-H1*
	H0-D2*	H0-D2*		H0-D2**
	H0-D5***	H0-D5***	H0-D5***	
	H1-H2*	H1-H2+	H1-H2+	H1-H2**
	H1-D5**	H1-D5*	H1-D5***	
			H2-D5***	H2-D2***
	H5-D5**		H5-D5**	
			D2-D5***	D2-D5*

TABLE 4

Stereotyped Utterances

Mothers' Speech Variables (Mean Percentages)

Mother Groups	Social Stereotypes	Imperative Idioms	All Idioms	Look	Attentionals (Look & See)	Stock Expressions
H0	.60	6.11	10.03	1.71	1.96	2.35
H1	1.66	2.81	7.29	4.06	4.37	1.10
H2	1.10	.20	2.90	1.80	2.20	.90
H5	.15	.40	3.50	1.40	1.60	.30
D2	1.10	1.65	3.90	9.05	10.15	.55
D5	.55	5.55	6.70	1.90	2.05	.40
Significant Differences:				H0-H1*	H0-H1+	
		H0-D2*	H0-D2*	H0-D2**	H0-D2**	H0-D5+
		H1-H2*	H1-H2**	H1-H2**	H1-H2**	H0-D5+
			H1-D2*	H1-D2*	H1-D2*	H1-D2+
				H1-D5**	H1-D5**	
		H2-D2*		H2-D2**	H2-D2**	
				D2-D5**	D2-D5**	

TABLE 5

Other Utterance Types - (Preposition Free)

Mothers' Speech Variables - (Mean Percentages)

Mother Groups	Vocatives (Name)	Greetings	Action Routines	Total Prop. Free
H0	3.33	3.01	1.56	9.03
H1	2.66	4.43	1.91	9.56
H2	.20	.25	.25	1.20
H5	.15	0	0	1.15
D2	4.85	1.25	.55	7.60
D5	1.90	.15	.30	2.70
Significant Differences:		H0-D5*	H0-D5+	H0-D5**
	H1-H2*	H1-H2**	H1-H2+	H1-H2***
		H1-D2*		
		H1-D5**		H1-D5***
	H2-D2**			H2-D2**
	H2-D5**			H2-D5*
	H5-D5**			H5-D5*
	D2-D5*			D2-D5***

TABLE 6

Discourse Features

Mothers' Speech Variables (Mean Percentages)

Mother Groups	Total Repetitions	Total Expansions	Total Imitations	Self Answers
H0	23.20	0	0	1.44
H1	20.60	0	.25	1.00
H2	8.05	10.10	4.90	0.85
H5	2.80	2.30	2.10	0.65
D2	20.85	0.65	0.15	2.00
D5	13.15	4.85	3.10	2.00
Significant Differences:	H0-D5*	H0-D5**	H0-D5**	
	H1-H2***	H1-H2***	H1-H2***	
	H1-D5*	H1-D5***	H1-D5**	H1-D5*
	H2-D2**	H2-D2***	H2-D2***	H2-D2*
	H2-D5*	H2-D5*		H2-D5*
	H5-D5***	H5-D5*		H5-D5*
	D2-D5*	D2-D5**	D2-D5**	

TABLE 7

Mothers' Speech Style

Mothers' Speech Variables (Mean Percentages)

Mother Groups	Run On	Disfluent	Total Degraded Sents	Incomplete	Unacceptable	Single Words
H0	0.25	0.70	0.95	0.60	1.89	14.60
H1	0.45	1.51	1.96	0.96	2.27	15.88
H2	0.40	3.60	4.00	1.25	2.10	6.35
H5	1.55	3.90	5.45	2.80	1.70	3.50
D2	2.45	1.35	3.80	0.65	1.55	23.95
D5	1.55	2.30	3.85	1.70	0.90	10.50
Significant Differences:	H0-D2*		H0-D2*			H0-D2≠
	H0-D5*	H0-D5**	H0-D5**	H0-D5***	H0-D5≠	
		H1-H2*	H1-H2≠			H1-H2***
	H1-D2≠					H1-D2≠
	H1-D5≠		H1-D5*	H1-D5*	H1-D5*	H1-D5**
	H2-D2≠	H2-D2*				H2-D2***
	H2-D5≠				H2-D5*	H2-D5**
		H5-D5≠				H5-D5***
		D2-D5≠		D2-D5**		D2-D5**

TABLE 8

Mean Scores and Results of Comparisons for Types of Conversational Acts in Mothers' Speech

Conversational Act Code	Mean Score						Comparisons		
	H1	H2	H5	D2	D5	Overall	H1 & H2 vs D2 & H5	H2 & H5 vs D2 & D5	H1 & D5 vs H2 & D2
Requestive									
1. Solicit Information	41.3	59.0	58.0	41.5	59.3	*		g	
2. Solicit Action	29.4	17.6	11.9	23.6	13.3	θ	g		
Assertive									
3. Perceivable Phenomena ..	26.3	21.8	32.4	47.4	22.6	θ	**g		θθ
4. Internal Phenomena	14.4	6.4	9.6	5.9	8.9	*	g		θθ
5. Social Phenomena	4.1	5.3	10.0	2.3	4.8	**		**g	
Performative									
6. Initial	18.6	0.8	0	8.6	7.0	θ		θg	
7. Reactive	1.8	1.3	0.4	3.3	2.0	*		**g	
Responsive									
8. Supply Solicited Information	3.1	6.4	11.0	5.3	6.0	θ		**g	
9. Supply Additional Information	13.1	39.1	36.1	6.0	32.0	θ		**g	
Regulative									
10. Solicit Other	25.4	32.0	9.0	38.9	33.3	θ		θg	
11. Mark Content	3.3	1.1	3.1	3.4	3.4		g		
12. Expressive	17.9	7.6	8.6	11.5	4.4	**	g		
Uncodable	1.3	1.4	3.5	1.9	2.6		g		
Unintelligible	0.5	0.4	4.6	0.6	0.6	*			

* $p < .05$ (2 tt)
** $p < .01$ (2 tt)
θ $p < .001$ (2 tt)
θθ $p < .001$ (1 tt)

g indicates which of the two alternative hypotheses obtained the higher score.
A higher score for H1 & H2 vs D2 & D5 suggests that age is more pertinent.
A higher score for H2 & H5 vs D2 & D5 favours language ability.

A LONGITUDINAL STUDY OF THE LANGUAGE DEVELOPMENT OF THREE DEAF CHILDREN OF HEARING PARENTS.

by

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INTRODUCTION

Recent research has suggested that language development should be viewed in the context of the development of communication systems (Bates, 1976; Halliday, 1975). Thus the use of symbols and syntax in a fully developed language can be seen as the end-point of a developmental process having its roots in the non-verbal communication systems used in infancy. It has also been suggested that language development and cognitive development are closely allied (Edwards, 1973).

The deaf child of hearing parents is presented with, at best, an incomplete spoken language model. Consequently these children, of necessity, prolong the period of non-verbal communication (Feldman, Goldin-Meadow & Gleitman, 1978). However, as there is no evidence that deaf children are delayed in cognitive development (Furth, 1971; Vernon, 1968) it is to be assumed that they will wish to communicate much the same sorts of things as hearing/speaking children. It is therefore suggested that they adapt and enlarge the non-verbal systems developed in infancy to enable the expression of complex semantic relationships (Tervoort & Verbeck, 1967).

In this study communication systems developed by deaf children of hearing parents were analysed in terms of both the structure of the systems and the semantic relationships which could be expressed.

METHOD

Subjects

The subjects (2 boys, Grant and Steven, and 1 girl, Annette) were the youngest children attending an oral pre-school for deaf children at the commencement of the study, who had:-

1) A congenital severe or profound hearing loss
2) No other identifiable handicaps
3)* No manual methods of communication available to them

(*Grant did not fully satisfy this criterion as shortly after the commencement of the study his parents started to use Cued Speech. However, as this was not used systematically and as Grant did not appear to attend to it, and never used it, it was decided to retain him in the study.)

At the beginning of the study Grant was 13 months old, Steven was 18 months old, and Annette was 21 months old.

All of the children had had their hearing loss diagnosed no more than three months prior to the time of inclusion in the study.

Grant had a hearing twin sister and an older brother and sister. Steven and Annette were both the only child in their respective families.

All of the children came from comfortable middle-class homes, and none of the mothers were employed outside of the home.

Data Collection

Half-hourly videotapes were made by the experimenter in each child's home at monthly intervals, Grant and Steven being followed until they were 30 months old and Annette until she was 38 months old. The parents were informed that the purpose of the investigation was to study the language development of deaf children and were asked to follow a normal routine during the filming sessions. The content of the videotapes varied, but mainly involved the mother and child in informal play activities. Occasionally other members of the family were also present.

Analysis of Videotapes

The analysis of the videotapes presented many methodological problems. First, communicative gestures had to be separated from all the wriggling and ear scratching, and attempts at speech had to be separated from all other vocalizations.

The criteria for accepting spoken words were:-

a) They were uttered with the intention of communicating

b) They approximated English words

The criteria for accepting gestures were:-

a) That they were used with the intention of communicating, therefore, excluding informative and interactive behaviours.

b) That they were symbolic, thus eliminating direct actions on people or objects.

c) That they were made primarily with the arms and hands, although head shakes and nods were also accepted. (Non-verbal behaviours such as posture, facial expression and gaze were excluded, although these para-linguistic behaviours frequently were used as indicators of intent to communicate and also as clues to the meaning of gestures.)

The gestures were described in terms of the notational system proposed by Stokoe (1961) to describe the signs of American Sign Language. In this system the sign (or gesture) is defined in terms of the hand configurations (dez), the place where the sign is made (tab), and the movements of the hands in executing the sign (sig). Stokoe referred to these components of signs as the cheremes and regarded them as equivalent to the phonemes of spoken language, although they are obviously produced simultaneously rather than consecutively.

Reliability of Transcriptions

In the literature on the acquisition of spoken language by hearing children, there is a lamentable lack of reliability studies on date transcriptions. Thus detailed analyses and sophisticated theories frequently rest on one person's interpretation of the child's spoken utterances (e.g., Halliday, 1975; Bloom, 1970; Greenfield & Smith, 1976). There are good reasons for this. It is essential that the second

transcriber be as familiar with the child, with the home environment and with the type of data being analysed as the experimenter if high levels of agreement are to be reached. Such personnel are not readily available, therefore extensive training programmes are likely to be required. Reliability studies are therefore time consuming and expensive to conduct. However, as the present data are particularly vulnerable to the criticism of experimenter bias and reading too much into vague movements, it was deemed essential to demonstrate that acceptable degrees of reliability could be obtained for the transcription of the videotapes. Extensive reliability studies were therefore undertaken. The percentage of communicative units identified by both transcribers ranged from 71% to 92% depending upon the complexity of the tape and the method of transcription. There were felt to be acceptable levels of agreement.

I. RESULTS Cherlogy - Handshape, location and movement of the hand and arms.

Schlesinger & Meadow (1972), McIntire (1977), and Prinz & Prinz (1979) reported that children who are exposed to sign language from birth begin to use signs at an earlier age than hearing children begin to use spoken words.

This is surprising, as data on neurological development suggests that hand function is fairly premature in the first year and that the child does not have good control over individual finger movements. This suggests that any signs which are produced are likely to show considerable distortion. Schlesinger & Meadow mentioned that the children in their study used "baby signs" and Prinz & Prinz gave a few examples of handshape distortions.

In the same way that hearing children produce certain sounds before others, it might be expected that deaf children would produce some of the cheremes of Sign Language before others. Boyes (1973; reported in Siple, 1978) applied the concept of markedness developed by Jakobsen (1968) to predict the order of acquisition of the handshapes of American Sign Language (ASL) by children.

Boyes grouped ASL handshapes into the following four categories, ordered in terms of difficulty and complexity, and predicted that the order of acquisition would follow this pattern. (The letters and numbers represent the positions adopted by the fingers in representing the American one-handed fingerspelled alphabet.)

1.	A	S	L	(baby)		0	5	C	G
2.			B			F		O	
3.	I	D	Y		P	3	V	H	W
4.		8		7		X	R	T	

('Baby O' handshaped is formed by opposition of the thumb and index finger, i.e., the configuration used for a pincer grip).

McIntire (1977) analysed the data obtained from four videotapes of a deaf child acquiring ASL between the age of thirteen and twenty-one months in terms of the substitution errors in the handshape component of the signs produced by the child. She found that a high percentage of the handshapes used by the child were from Boyes' Group 1 and that substitution errors were always in the direction of using a hand configuration from an earlier group.

Analyses of the gestures used by the three children in the present study showed that they all used a very limited number of different handshapes, locations for signs and hand and arm movements. There was a great deal of similarity in the components used by the three children.

The B and 5 - handshapes were not distinguishable before the age of 30 months, the handshape produced rather being a relaxed flat hand with the fingers slightly apart. This was called 'Baby B' handshape. This handshape was used on the first videotape of each subject and was by far the most frequently used handshape on all tapes. The next most frequently used handshape was the G-hand (pointing hand). A, O, and C handshapes were occasionally used. All of these handshapes were present before two years of age and no new handshapes were used up to thirty months of age. These findings are consistent with those of Boyes and McIntire.

Most of the gestures used by Grant, Steven and Annette were made in the space immediately in front of their bodies. They often made contact with objects but much less frequently made contact with their own body when gesturing.

The range of hand and arm movements used by the three children was also limited. Large up/down or in/out sweeps of the arm were the most frequently used movements, followed by wrist movements and wriggling of the fingers. No gestures involving the interaction of the two hands were observed. This is consistent with the finding of Berges and Lezine (1965), and Connolly and Elliott (1972).

Knowledge of the types of handshapes and arm and wrist movements which children are capable of making, and which they spontaneously produce, permits predictions to be made about the types of errors which young children are likely to make when using Sign Language. Armed with this information teachers and parents should be able to improve their ability to understand the deaf child and consequently to respond more appropriately to his attempts at communication.

II. Frequency of Production of Gestures and Speech

All three children in the present study communicated primarily by means of gestures (Figure 1). As would be expected there was some variability in the frequency of gesturing from tape to tape. However, subjects tended to present consistent patterns.

Steven and Annette characteristically made frequent attempts to communicate by means of gesture, in contrast to Grant's rare gestural communication. A dramatic increase in the frequency of gesture production occurred for Annette at 28 months of age, and was maintained. This can be compared with the sudden increases in speech production observed in hearing children learning to talk.

Few spoken words were produced by the children. Annette produced significantly more speech than the others. However, in contrast to her high rate of gesturing, her speech production was sparce. An increase in her speech production was observed at 32 months and this was also maintained (Figure 2).

It is interesting to speculate whether Grant's apparent lack of interest in communicating was related to his twinship (Day, 1932; and Mittler, 1970 reported delayed language development in twins. His hearing loss was diagnosed earlier than either of the other two children and he had Cued Speech available to him. It might therefore have been expected that he would be the most advanced in language development.

III. Utterance Length

Gestural utterances. It is first essential to define the features which determine the beginning and end of an utterance, i.e., the gestural juncture cues. The beginning of an utterance is usually identified by the hands moving from rest and starting to gesture. Pausing, returning the hands to a resting position, or holding a gesture for longer than usual, have all been described as end juncture in American Sign Language (Stokoe, 1972; Covington, 1973). There were also found to be the major cues for juncture in these children's gestural systems. Direct imitation and interruptions were also taken as end markers.

Gestural strings consisting of the repetition of a single gesture were counted as single gesture utterances, and repetitions of two gestures were counted as a single two-gesture utterance.

In adult sign language, repetition may be used to indicate pluralization, an ongoing activity, or emphasis (Cohen, Namir & Schlesinger, 1977). There was little evidence that it fulfilled any of these functions in these children's communication systems, with the possible exception of emphasis. Most frequently repetition seemed to be used when the mother did not initially respond.

In most cases there was little doubt about utterance boundaries, and inter-rater reliabilies on utterance length consistently reached over 90%.

For all of the children, the single gesture utterance was the most common communicative form. However, they all combined gestures to form two-gesture utterances (Table 1).

The frequency of two-gesture utterances increased as the children got older and Annette and Steven occasionally produced three- and four-gesture utterances. However, the steady rise in mean length of utterance observed in Brown's (1973) hearing subjects was not observed, possibly due to the fact that the gestural systems did not contain any bound morphemes (Figure 3).

Spoken utterances. Speech was infrequently used by all of the children and only three instances of two-word utterances were recorded (see Table 2). Although words were rarely combined, word/gesture combinations did occur and were apparently becoming Annette's chosen method of communication. The word and gesture in these combinations frequently carried the same meaning, e.g., "no" and a headshake, "allgone" and an 'allgone' gesture, so that the two elements reinforced each other. Words and gestures were, however, also combined to make more complex utterances, e.g., Annette, at 27 months, whilst playing at feeding her dolls pointed to a cup, simultaneously said "baby", then gave the doll a drink from the cup. Utterances in which the gesture and word carried different meanings were more frequent on the later tapes. In over 90% of the word/gesture combinations, the two elements occurred simultaneously. This is in marked contrast to spoken language in which the elements, i.e., words must, of necessity, be produced sequentially.

IV. Establishment of a Lexicon

It was crucial to demonstrate that each child established a lexicon, otherwise it could be argued that they simply generated gestures or pantomime to express an idea at a particular time but did not use gestures consistently or systematically to establish a communication system.

In order to be included in the child's lexicon both spoken words and gestures had to be:-

1. used consistently, i.e., they had to appear on at least two tapes. Thus pantomime generated to convey a particular idea was excluded.

2. used spontaneously, i.e., direct imitations of the mother's speech or gestures were excluded. (In practice, it was found that the mothers more frequently imitated the child's gestures than vice versa).

These stringent criteria may have led to an under-estimation of the child's lexicon. However, it is unlikely that any items which are not part of the lexicon have been included.

Pointing was by far the most frequently used gesture for all three children. If this was glossed separately for each referent, it unrealistically inflated the child's lexicon.

On the other hand, if pointing was excluded, it denied a great deal of the communicative behaviour of the child. It was ultimately decided to include pointing in the lexicon under three readings:

(i) Pointing to an object which could be translated by 'this' or 'that'.
(ii) Pointing to a person which could be translated by a pronoun.
(iii) Pointing to a location which could be translated as 'there'.

The remaining gestures were glossed on the basis of extralinguistic contextual clues and on clues from the iconic nature of the gestures, e.g., "car". There are problems with this, however, as the gesture glossed "car" could equally well be glossed "drive" and "food" could equally well be "eat". Therefore, great care had to be taken in glossing items and the glosses had to be checked for appropriateness each time the gesture occurred.

Although there was little evidence of direct imitation on the videotapes, almost all of the gestures used were common ones which had apparently been gleaned from the hearing community, e.g., "give me", "where", "here", "sleep", "come", "stop", "all gone". There was, therefore, considerable commonality in the gestures used by the three children as they came from very similar cultural backgrounds. Both Steven and Annette used pantomime to communicate, but there were few

examples of invented gestures forming stable elements in the children's lexicons (Table 3).

All of the children had larger gestural than spoken lexicons at 30 months. In both modalities however, their lexicons were extremely meagre, and unlike hearing children in whom a sudden burgeoning of vocabulary is observed, they appeared to add to their lexicons slowly and laboriously.

Although Annette showed dramatic increased in the frequency of production of gestures and spoken words after 30 months of age there was no concomitant dramatic increase in her gestural or spoken lexicons (Table 4).

It would, therefore, seem that when deaf children are not presented with a systematic language model in either the auditory/vocal or the visual/motor channel, they attempt to develop communication systems based on whatever gestures and sounds are available to them. Thus the child's communication system is based on an incomplete and inconsistently used gestural language model and a few arduously learnt spoken words.

V. Structure of Utterances

All utterances containing two communicative units were analysed in terms of the positions of the elements in the utterance. The two elements occurred simultaneously in over 90% of word/gesture combinations and occasionally also in two-gesture combinations. In most gestural utterances however, the elements appeared sequentially.

An analysis of these sequentially organized utterances showed that for Grant and Steven no gestures occupied privileged positions of occurrence. For Annette, however, up to 28 months "pointing" when it occurred, always occupied the first position in the utterance (except of course, when both elements in the utterance were pointing, e.g., pointing - object A - pointing - object B) and "give" was always a second position gesture.

On later tapes when Annette was producing longer utterances these gestures ceased to occupy their privileged positions.

Neither "pointing" nor "give" could, however, be regarded as pivots as they could be combined with each other in an utterance and pointing

could be combined with pointing in an utterance. Gesture order in two-gesture utterances could, therefore, be regarded as generally more flexible than word order in spoken utterances.

VI. Semantic Functions

Considering the short surface structure and flexible gesture order one might expect that the children's utterances would be highly ambiguous. In practice this was not the case as contextual and paralinguistic cues disambiguated most messages and the children were able to convey quite complex ideas. E.g., "give" was a common gesture used by all of the children. This requires an actor, a patient, and a recipient, any or all of which could be deleted from the gestural utterance. The actor was usually nominated by means of glancing, the patient by the direction of the hand, and in all cases the recipient was the child.

The recent trend in the literature to the analyses of prelinguistic vocalization and one-word utterances has provided precedents for combining utterance and context for the analysis of the child's early utterances. This rich interpretation permits the analysis of the underlying semantic functions which the child is able to express.

An analysis of the subjects' utterances based on the system proposed by Greenfield and Smith (1976) was carried out and examples from Annette's and Steven's utterances were found to fill all of the semantic functions. No examples could be found for two semantic functions in Grant's utterances (Table 5).

The age at which each semantic function was first recorded for each subject together with the data from one of Greenfield & Smith's subjects (Nicky) is presented in Table 5. Unfortunately as Steven and Annette were older than Greenfield & Smith's subjects at the beginning of the study, the developmental patterns are not obvious, as most of the semantic functions were already present. Some developmental trends can be observed for Grant.

In Table 6 examples from Annette's data are presented to illustrate each semantic function.

CONCLUSIONS

Deaf children of hearing parents, who do not have access to an intact language model, satisfy their desire to communicate primarily by the use of gestures which they glean from the hearing community. Their gestural and spoken lexicons are small and the structure of their communication system is very simple.

In the present study the most common utterance was the single gesture utterance, however, gestures were combined with each other and with spoken words to produce longer utterances.

In two gesture utterances and in word/gesture combinations it was possible for the elements to be produced simultaneously. This is in marked contrast to the temporal sequencing of spoken language. In general, the gesture order in utterances was more flexible than the word order of spoken language used by hearing children.

The content of the children's utterances indicated that they were able to express the same semantic relationships as hearing children at a similar stage of language development.

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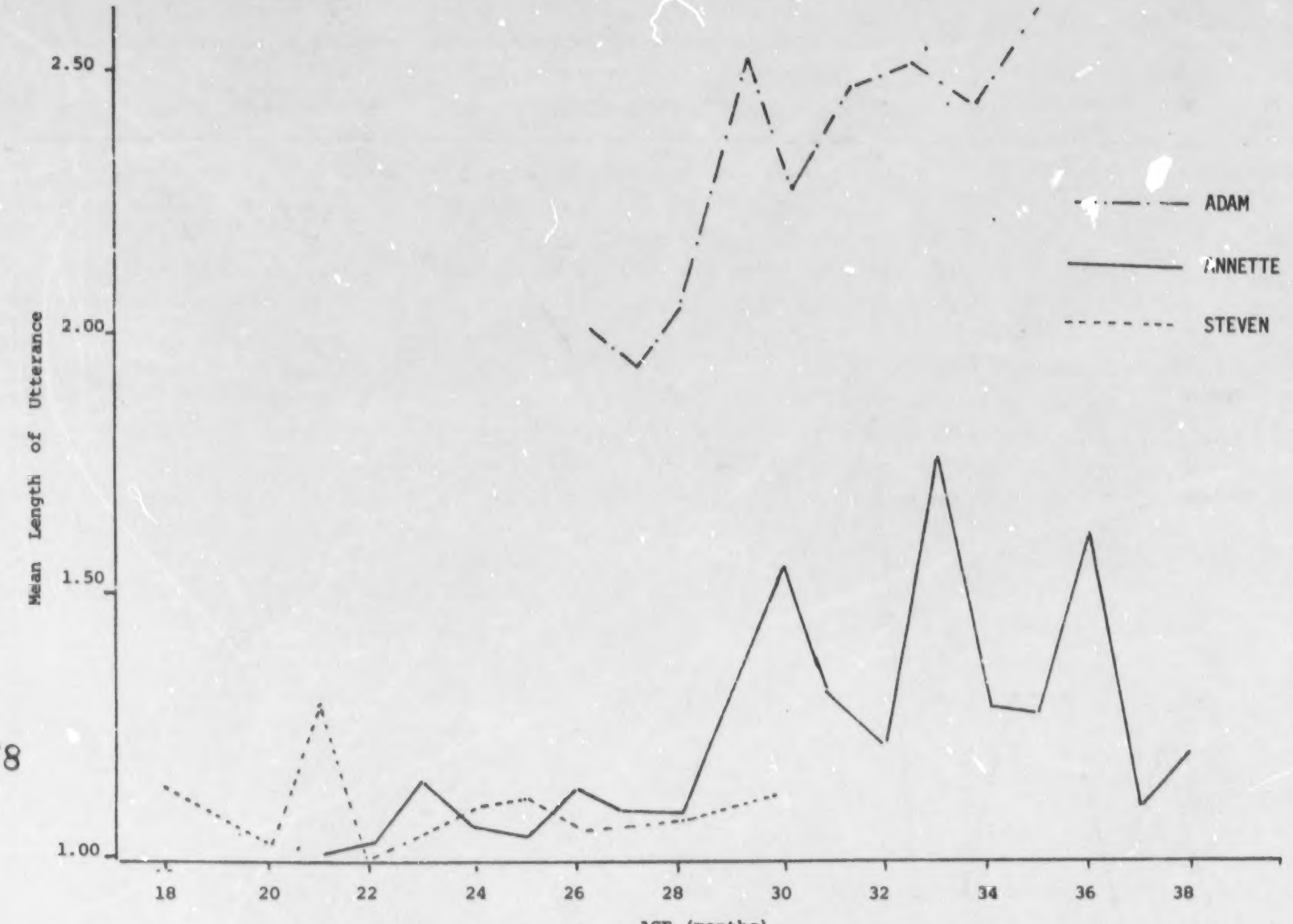

FIGURE 3. Mean length of utterance at each age for Steven and Annette, compared with mean length of utterance for Adam, one of Roger Brown's hearing subjects (Brown 1974)

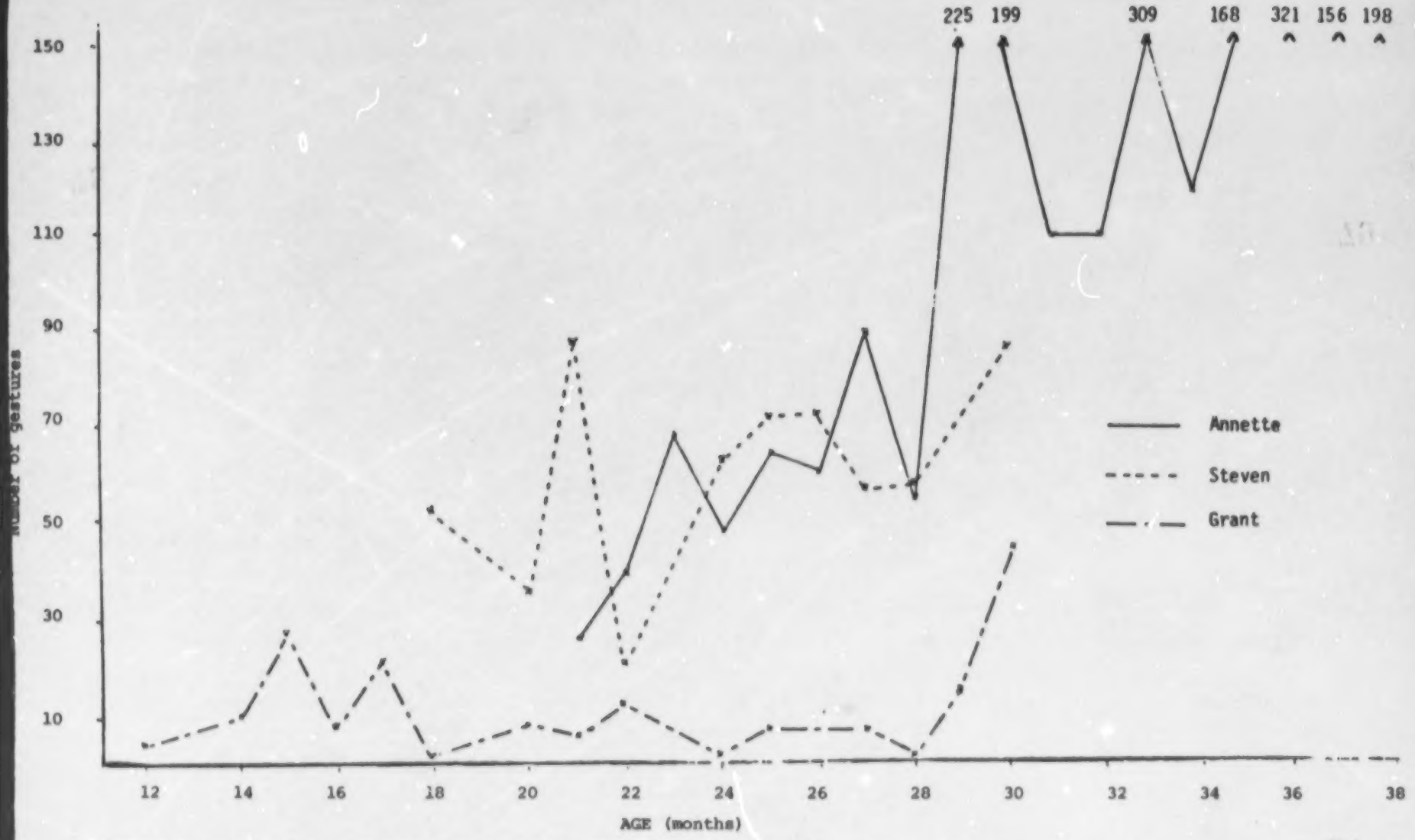

FIGURE 1. Total number of gestures, including imitations and repetitions, on each tape.

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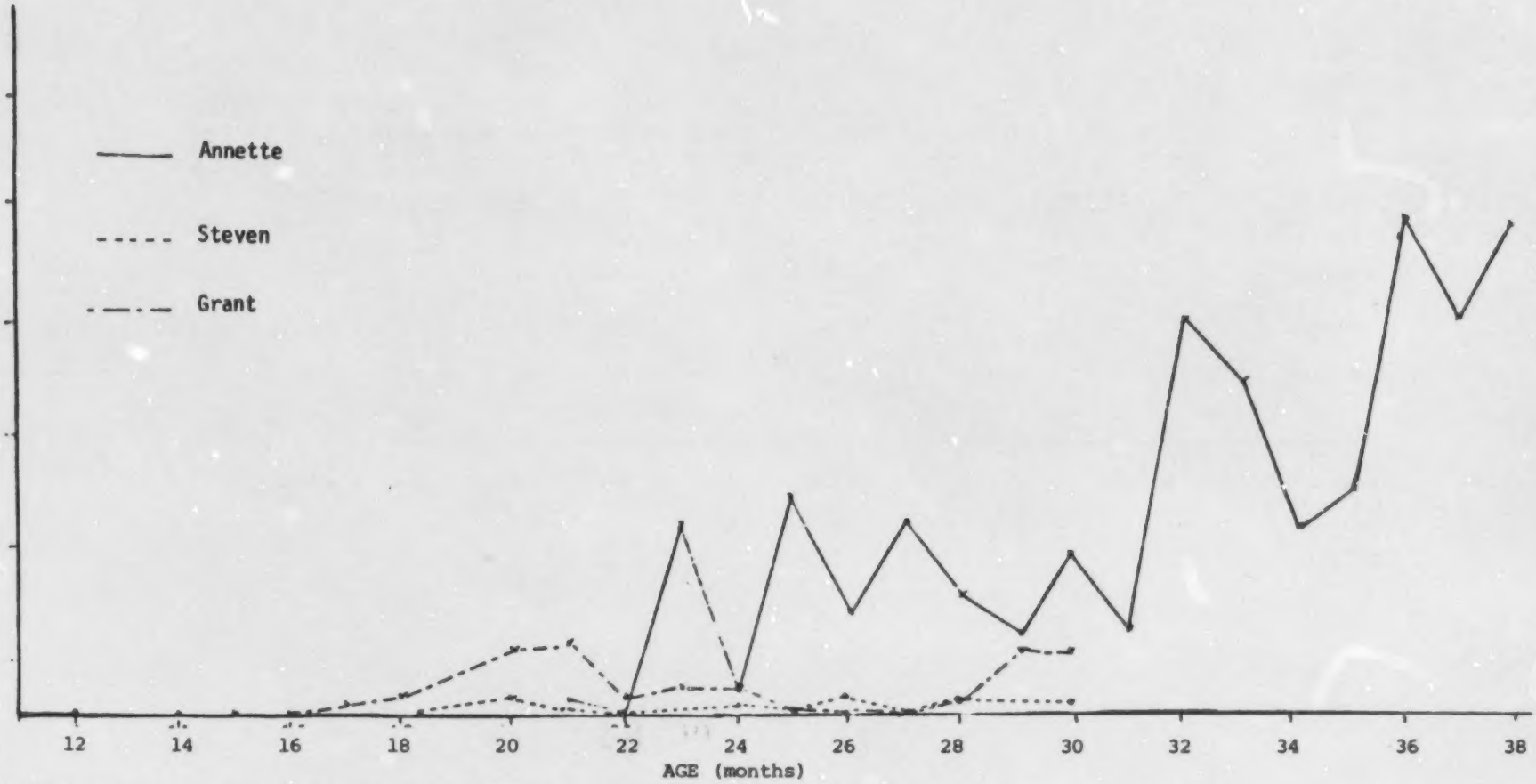

FIGURE 2. Total number of spoken words, including imitations and repetitions, on each tape.

TABLE 1

Number of Gestural Utterances According to Length

Subject	No. of tapes	Age range (months)	No. of gestures/utterances			
			1	2	3	3+
Grant	17	12-30	108	21	-	-
Steven	10	18-30	426	37	5	5
Annette	10	21-30	430	68	11	13
Annette	8	31-38	484	129	28	24

TABLE 2

Number of spoken utterances according to length

Subject	No. of tapes	Age range (months)	No. of gestures/utterances 1	2	1 word +1 gesture	*Complex mixed
Grant	17	12-30	29	-	9	-
Steven	10	1P-30	5	-	9	-
Annette	10	21-30	66	1	62	21
Annette	8	31-38	111	2	129	69

*Complex mixed utterances consisted of both gestures and speech and contained more than two elements.

TABLE 3

Gestural and spoken lexicon at 30 months

	Gestural lexicon at 30 months	Spoken lexicon at 30 months
Grant	9 (13)	3 (13)
Steven	22 (41)	2 (12)
Annette	35 (72)	9 (20)

(The figures in brackets indicate the total number of different gestures and words recorded, i.e., including those which occurred on one tape only).

TABLE 4

Gestural and spoken lexicons for Annette at 38 months

	Gestural lexicon at 38 months	Spoken lexicon at 38 months
Annette (18 tapes)	65 (111)	18 (41)

TABLE 5

Age (months) at first recording of each semantic function

	Grant	Steven	Annette	Nicky
Performative	15	18	21	8
Volitional	12	18	21	11
Agent	16	18	22	13
Action or stage of agent	14	20	23	14
Object	24	18	22	16
Action or stage of object	18	20	21	18
Dative	20	20	23	18
Obj. Assoc. with obj.	22	21	22	18
Animate Assoc. with obj.	-	24	22	18
Location	30	21	22	18
Modification	-	21	27	19

TABLE 6

Examples of each of Greenfield and Smith's semantic functions taken from Annette's data.

Semantic Category	Item	Context
Performative	Bye-bye	A gives a doll to Mo and takes a step back and waves bye-bye.
Volitional	Give	A holds out her hands towards a doll which is out of reach and glances at Mo. (I want the doll.)
Agent	Pointing (person observer)	A lies across mothers knee watching H. filming. Glances at Mo and points to H. (Heather is filming).
Action or State of Agent	"Mistake"	A throws pencil under the side board. Looks at Mo and places her hand over her mouth. (I made a mistake).
Object	Pointing (object ribbon)	A tries to take ribbon off the rabbit. She can't do it so she holds the rabbit towards Mo and points to the ribbon. (Take the ribbon off mum).
Action or State of Object	Hot	A looking at radiator holds up her hand in gesture for HOT and glances at the doll which she is holding. (The radiator is hot).
Dative	Supinated pointing	A places a cup in front of the doll and points to the doll (This is for you).
Object Associated with an object or location	Pointing (Object container or location near)	A studies a container with which she has been playing. She points to its rim and looks around on the floor for the lid. (Where's the things which belongs here?)
Animate being associated with an object or location	Pointing (location) "mork" (work)	A looking at family picture, recognizes her father and points to the front door and says "mork" (work). (Daddy is out at work).
Location	Pointing (Mo's ear)	A drops Mo.'s earring. Mo. picks it up. A points to Mo.'s ear. (The earring goes on your ear).
Modification of an event	"More"	A holds a cup and a jug towards the dolls and says "more" (Would you like more to drink?)

USE OF VERBAL AND NON-VERBAL CONTROL TECHNIQUES BY MOTHERS OF HEARING-IMPAIRED INFANTS

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INTRODUCTION

Much of the literature concerned with children's early development has centred on the concept of "attachment" (Ainsworth, 1974; Bowlby, 1979; Schaffer, 1971), although a more recent approach in the study of early development has given emphasis to the *interactive* quality of early social behavior (Schaffer, 1977). This involves viewing the mother-child relationship as a dynamic system in which both partners play a part in achieving mutual synchrony. Researchers now ask questions concerning the relative contributions of each partner and the characteristics of the relationship at different stages of development. A major focus in this respect has been the examination of the language used by caregivers to their young children.

The importance in the language acquisition process of mothers' speech to young children has been well established, as has the fact that it is different from mothers' speech to adults in several ways (Glanzer & Dodd, 1975; Phillips, 1973; Snow, 1972; Snow & Ferguson, 1976). Speech to young children is simplet in vocabulary and syntax, consists of shorter utterances spoken at a slower rate, is highly redundant and possesses specific intonation contours.

Given the undoubted significance of the linguistic behavior of the caregiver (Lewis and Freedle, 1972; Nelson, 1973) for children's language acquisition, the scarcity of research into the interactions of mothers with their handicapped children is a source of concern to

practitioners in special education (Moores, 1976). Mothers whose children have handicapping conditions such as language delay and mental retardation show some differences in the amount and type of communication situations under which they communicate with their children as compared to the data on normal children and their caregivers (Bondurant, 1977; Buium, Rynders & Turnure, 1974; Wulbert, Inglis, Kreigsmann & Mills, 1975).

Buium et al. (1974) point out that the linguistic environment provided by the caregivers of Down's Syndrome children is different in terms of the frequency of occurrence of a number of linguistic parameters, including use of imperative sentences and Wh- type questions, when compared with maternal language provided for age-matched normal children. However, Turnure and Rondal (1976) found that Down's Syndrome children matched for language development with younger normal children were exposed to similar language environments by their caregivers. In a further study of the language used by mothers of Down's Syndrome children, Buckhalt, Rutherford and Goldberg (1978) reported that maternal speech did not change between nine months and twenty-four months of age. This was supported by Gunn, Clark & Berry (1980) who, in a longitudinal study of one child from 3.7 to 17 months of age, found no differences in the complexity of mother's language as measured by mean length of utterance. They did, however, note differences in the frequency of object referencing and "direction" (i.e., by the mother in interacting with her child as his age increased). Their findings, in conjunction with those of Marshall, Hegrenes, and Goldstein (1973) indicate a marked change in the direction variable which, in the light of Nelson's (1973) study, would seem to be negatively correlated with subsequent level of language development of the child. Further, if Nelson (1973) is correct about the impeding effects of that mismatching of maternal and infant communication style on oral language development of normally hearing infants, then it is certainly possible that the communication mismatching between handicapped children and their parents could have serious repercussions for language development.

Further consideration of this possibility as far as hearing-impaired infants and their mothers are concerned is limited by the small number of studies that have examined maternal speech to hearing-imapired children (Brinich, 1980).

Seitz and Marcus (1976) in a study of one twenty-month-old hearing-impaired child, using Mean Length of Utterance (MLU) and frequency of Wh-questions ad indices of the complexity of the mother's speech, noted that although the mother's MLU seemed appropriate, her speech was heavily weighted with directives and lacked developmentally appropriate Wh-questions. They expressed concern regarding the "excessive intrusion (p. 449)" demonstrated by mothers who were over-concerned with ensuring verbal input, and concluded that this situation might best be improved by the mother addressing her language to child-initiated activities and thus capitalizing on the child's attention and motivation.

Seitz and Marcus' findings are supported by Collins (1969) who found that mothers of hearing-impaired children communicate mainly to direct the activities of their children, and by Goss (1970) who compared the language used by twenty mothers to their hearing-impaired preschoolers to that used by other mothers to their young hearing children. Goss found that the mothers of the hearing-impaired children were more likely to show disagreement, tension, and antagonism and to give more suggestions and to ask fewer questions. Anderson (1978), in a detailed study of three families with hearing-impaired children, with an age range of 4.5 to 32 months, reported findings which were at variance with these studies. She concluded that the speech addressed by the caregivers to the hearing-impaired children was "strikingly similar (p. 241)" to the data presented by Snow (1977) in her study of two normally hearing children. This assertion was based on measures of the occurrence of maternal speech of questions, imperatives, referential features, repetition of content, and mothers' attempts to elicit responses from their children.

Cross (1980), however, as a result of a study of maternal speech to hearing-impaired children from 25 to 70 months, disagreed with Anderson (1978) on the basis of examination of her measures of complexity of maternal utterance, use of prepositions, use of vocatives, imperatives and questions, the grammaticality of utterances, and references to the child. A comparison of these measures of maternal speech to hearing and hearing-impaired children of two years of age led her to conclude that "mothers speaking to hearing two-year-olds address them differently from

hearing-impaired children matched either for age or level of spontaneous language use (p. 23)." In relation to such maternal speech differences Cross further concluded that they are specifically determined by the receptive abilities of the child and that such "aberrant speech adjustments could be expected for mothers of deaf children of all ages (p. 27)."

The findings of Cross (1980) are supported by those of Wedell-Monnig and Westerman (1977) who, in an examination of the language of mothers to six hearing and to six deaf 13- to 20-month-olds, observed that the mothers of the hearing infants used more complex language than the mothers of the hearing-impaired infants (as measured by MLU). They also noted that the mothers of the hearing children used significantly more interrogatives, but did not observe any differences in the use of imperatives or declaratives when they were compared with the mothers of the deaf infants. Like Cross (1980), they concluded that the less complex speech of the mothers of the hearing-impaired group appeared to be a function of the feedback from their children and that continued feedback of noncomprehension served to keep maternal speech at a very simple level.

All of the above studies are primarily concerned with mothers' speech addressed to their young hearing-impaired children. Other important aspects of mother-child interaction concomitant with childhood deafness have been noted by Schlesinger and Meadow (1972) and Brinich (1980). The study of Schlesinger and Meadow is one of few developmental studies of hearing-impaired children in that the interaction patterns of mothers and their hearing-impaired children were observed at 3½, 5½ and 7½ years of age. Their sample included 40 hearing-impaired preschoolers and a comparison group of 20 age- and sex-matched hearing children. In free play situations with their children, mothers were rated on a number of dimensions of their behaviour, of their children's behaviour, and of behaviour in reciprocal mother-child interactions.

Their findings led them to conclude that the behaviour of mothers of hearing-impaired children differed greatly from that of the mothers of hearing children and that the mothers of the former group were "more likely to appear inflexible, controlling, didactic, intrusive and disapproving (p. 107)." Schlesinger and Meadow identify the problems

faced by many mothers in gaining the attention of their hearing-impaired children and point out that the methods used to achieve this may well have to be intrusive, authoritarian, or overly controlling.

Brinich (1980) augmented the coding scheme for maternal behaviours used by Schlesinger and Meadow (1972) to make it a more objective measure of 55 categories of maternal and child behaviour that he sought to define as "discrete behavioural events (p. 76)." He based his scheme on earlier work by Marvin and Bates (1971) and Watzlavick, Beavin and Jackson (1967) which permits coding of both verbal and non-verbal behaviour. These authors made the assumption that communication between mother and child occurs in both verbal and non-verbal modes simultaneously and that these two modes are able to convey parallel information. In his study of mothers of 40 hearing-impaired and 20 hearing children from 5½ to 6½ years of age, Brinich (1980) found that the mothers of the hearing-impaired group used significantly more behaviours related to gaining the child's attention than did the mothers of hearing children and, although there were no differences between the groups in terms of the use of maternal statements, the mothers of the hearing-impaired children used significantly more questions and instructions. Whilst Brinich admitted the low reliability of some of the categories of his coding scheme, he felt able to conclude that when mothers encounter difficulty in establishing reciprocal communication with their hearing-impaired children, they may adapt to that situation by assuming control of the relationship.

In summary, studies of the verbal (Collins, 1969; Goss, 1970; Schlesinger & Meadow, 1972; Seitz & Marcus, 1976; Wedell-Monnig et al., 1977) and non-verbal behaviour (Schlesinger & Meadow, 1972; Brinich, 1980) of the mothers of young hearing-impaired children conclude that they are more directive and controlling in their interactions with their children than are mothers of age-matched hearing children. There is, however, no detailed information available on the specific nature of the control techniques utilized by mothers in their interactions with their young hearing-impaired children, particularly in terms of their separate verbal and non-verbal behaviours, their degree of directiveness of child attention and activity, and changes over time on these dimensions.

For this reason, the purpose of this study is to utilize the procedure for analysis of maternal control techniques outlined by Schaffer and Crook (1978) to examine the interactions of mothers with their young hearing-impaired children at 15 and 24 months. Such examination will permit some comparison to the data on age-matched hearing children collected by Schaffer and Crook (1978) and, in addition, will allow more detailed observation of the maternal control techniques used by hearing-impaired children than has been previously possible. Further, changes in maternal control technique as a function of the age of the hearing-impaired child, will also be investigated.

THE STUDY

Schaffer and Crook (1978), in a study of mother-infant dyads involving children aged 15 and 24 months respectively, examined the nature of the techniques with which mothers directed their children's behaviour in a situation where the mothers were asked to take an assertive role. (In a free play situation with a number of toys the mother was asked to encourage her child to play with as many of the toys as possible.) The authors define control techniques as those methods employed by the adult with the aim of changing the child's focus of attention, modifying or maintaining his activity, and determining the grammatical form of the mother's speech when addressing the child. All classificatory distinctions, with one exception, were made at both verbal and non-verbal levels. In the case of the grammatical form of the mother's speech, the only distinction made non-verbally was between her use of gesture and actual manipulation of an object or the child.

Subsequent analysis of the mothers' behaviour led Schaffer and Crook (1978) to conclude that for the younger group 60% and older group 74% of the mothers' verbal controls occurred after the child itself had initiated a change of attention to another toy. They noted that with increasing age the child was more likely to initiate such toy shifts himself without the mother having to verbally direct him to do so. However when the mother did initiate a toy shift, in most instances (87% and 79% respectively), the shift was attempted with a verbal control that was intended to redirect the child's attention rather

than to direct his activity. Direction of activity was reserved until attention had been gained. They also noted that the mothers of the younger group used twice as many verbal controls of attention as did the mothers of the older group. There was no difference observed for the mothers' use of controls of activity between the two groups. Their final conclusion is noteworthy in emphasizing that even in a situation where the mother was asked to be more assertive in her interactions with her child, evidence for mutuality was still found.

The importance of this study relates not only to the results obtained but to the coding scheme developed, which allows simultaneous verbal and non-verbal classifications of the caregiver's behaviour on a number of discrete levels. It has particular importance in the examination of the interactions of mothers and their hearing-impaired children for the following reasons:

(i) If previous authors (Collins, 1969; Schlesinger & Meadow, 1972; Brinich, 1980) are correct in asserting that mothers of hearing-impaired children are more directive and controlling in their relationships with their children then the task, situation and coding scheme used by Schaffer and Crook (1978), provide a valuable means by which this might be further investigated.

(ii) In addition, more precise information on the nature of the control techniques used by such caregivers could be obtained. Measures made in both verbal and non-verbal modes at a number of levels could give further specific insight into the effects of childhood deafness on the mother-child relationship.

(iii) The age groups involved in the study allow observation of a group of hearing-impaired children who are younger than those involved in previous studies (Schlesinger & Meadow, 1972; Brinich, 1980). Further, collection of data on the behaviour of mothers of the two age groups makes it possible to examine changes in the mothers' behaviour over time.

(iv) The measures of the grammatical form of the mothers' verbal controls can be considered in relation to the conflicting findings of previous studies (Gunn et al., 1980; Anderson, 1978; Cross, 1980).

(v) The data collected by Schaffer and Crook (1978) provide a basis for comparison to the interactions of normally hearing infants and their caregivers.

For these reasons the age groups, task, situation and behavioural classification scheme used by Schaffer and Crook (1978) will be followed in this study in examining the interactions of hearing-impaired children with their caregivers.

Subjects

In the study twelve mother-child dyads were observed. The children comprised the entire known hearing-impaired population between thirteen and sixteen and between twenty-three and twenty-five months of age in Brisbane and Sydney, according to the records of the National Acoustics Laboratory and the respective State Education Departments.

The children were,

(i) severely and profoundly, pre-lingually hearing-impaired (i.e., a hearing loss averaging 75dB or more as measured at frequencies of 500, 1000, and 2000Hz),

(ii) between 13 months and 16 months (mean = 15 months; SD = 1.78 months) or between 23 and 25 months of age at the time of the study (mean = 24.5 months; S.D. = 0.76 months),

(iii) assumed to be at least normal intellectually by the organizations that catered for them,

(iv) living with intact families, and,

(v) without diagnosed additional handicaps at the time of the study,

(vi) all fitted with binaural hearing aids by a single agency,

(vii) from a variety of programs both state and private, home-based and centre-based, and,

(viii) contained approximately equal numbers of boys and girls.

The mothers,

(i) all consented to participate in the study,

(ii) were native English-speaking (with one exception where English was spoken as a second language),

(iii) used oral or manually supplemented methods of communicating with their children, and,

(iv) nine of the mothers had intact hearing, and three mothers were congenitally hearing-impaired. Two were able to communicate effectively with their children and the investigator by manual signs and finger spelling and the third by oral means alone.

Test Situation

The observational data were collected by videotaping mother-child interactions with a protable video-tape recorder. The camera was positioned so that a clear view of both infant, mother and toys was available at all times. A sensitive microphone was used to ensure all vocalizations were recorded. Ten of the sessions took place at the pre-school/parent guidance centre that the mother attended, two of the sessions at the parent's home and a further two in the recording studio at the Mt. Gravatt College of Advanced Education. The diversity of recording venues was necessitated by the distribution of such mother-infant dyads in Brisbane and Sydney. All of the recording was done by the senior investigator and took place in the two-month period, June - July, 1980. Each mother-child pair was observed for a period of eight minutes, no other adults or children were present during these sessions.

Procedure

The task and situation used by Schaffer and Crook (1978) were followed in that the mother and child were seated on the floor and eight toys placed between them. The range of toys used was considered to be of interest to both males and females of the ages observed. The mother was instructed to encourage her child to play with as many of the toys as possible and not to devote all his time to only one or two of them. This was to ensure that the mother took an active role in the interaction and so highlight her use of control techniques. The mothers were unaware of the exact time sample being used for later analysis but were only informed that their period on camera would be about ten minutes. All video-tape material was subsequently examined by the senior investigator and one assistant. The mothers' utterances were transcribed and detailed descriptions of maternal and child behaviour were made.

Response Measures

Schaffer and Crook (1978) made an initial distinction between non-verbal and verbal behaviour (Figure 1), each of which was further distinguished into behaviours affecting the infant's attention and its activity. Attention controls attempt to focus the child's visual or auditory attention ("Look at the ball!") and thus serve to introduce an object (or a locality) into the sphere of play. The child is expected to identify or locate something, usually as a prelude to an activity. Action controls aim to modify the infant's behaviour by specifying some activity that he is expected to perform, e.g., "Push the dollie!", "Give teddy to Mummy.", "Play with the car."

Both action and attentional controls may be classified as directives or prohibitives; and where directives control behaviour by guiding it into specialized directions prohibitives are designed to terminate or prevent an activity, e.g., "Don't eat teddy!" or to distract the child's attention away from the undesirable activity, e.g., "Look [instead] at this lovely doll!"

Finally, both directives and prohibitives are represented by different grammatical forms which may be an imperative ("Throw me the ball"), an interrogative ("Where's teddy?"), a declarative which

is in the manner of an embedded imperative, e.g., "I think its over there" and moodless statement which is inserted into the child's ongoing activity in order to modify its progress ("Careful!", "Gently").

FIGURE 1

CLASSIFICATION OF VERBAL CONTROL TECHNIQUES

Verbal Controls	Attention	directives	imperatives interrogatives declaratives moodless
		prohibitives	imperatives interrogatives declaratives moodless
	Action	directives	imperatives interrogatives declaratives moodless
		prohibitives	imperatives interrogatives declaratives moodless

(Schaffer and Crook, 1978, p. 68)

Non-Verbal controls again involve the distinction between those seeking the infant's attention and those attempting to change its activity. However, in this case, an additional distinction between gestures and manipulatives has to be made. Gestures generally do not involve contact and are symbolic in nature whereas manipulatives entail an action, bringing the infant into direct contact with the object. Such manipulatives may involve locating the object or toy in front of the child, demonstrating its function, or attracting the infant's attention by moving it (Figure 2).

FIGURE 2

CLASSIFICATION OF NON-VERBAL CONTROL TECHNIQUES

Non-Verbal Controls	Attention	directives	gestures manipulatives
		prohibitives	gestures manipulatives
	Action	directives	gestures manipulatives
		prohibitives	gestures manipulatives

(Schaffer and Crook, 1978, p. 72).

The analysis made by Schaffer and Crook involved the determination of how attention to a particular toy was initiated. To do this they examined the first maternal utterance that referred to a toy not referred to in previous utterances, and then considered what the child was doing at the time. This analysis demonstrated whether the mother was initiating the change of attention or whether she was following a child-initiated choice. The following example from Child Number 1 at 25 months demonstrates this.

FIGURE 3

ANALYSIS OF INITIATION OF ATTENTION CHANGE

Mother's Speech	Description of Activity
What's this?/Look/	Child plays with telephone. Mother picks up plane Child looks and mother demonstrates flying action
Brrr . . . . . ./	
Can you fly the plane?/	Child takes toy. Child play briefly with plane and then picks up keys which he holds up for mother to see.
Keys?/	
Put in and turn around/	

In this case, attention to the first toy (plane) was initiated by the mother but to the second toy (keys) by the child. The number of mother- and child-initiated toy shifts were tallied for the eight minute sample for each dyad (Level 1: verbal and non-verbal). In the cases where the mother initiated the toy shift the actual verbal control techniques used was recorded. In the example previously given it was with a verbal attentional control although there were instances where the mother used a verbal action control, e.g.,

FIGURE 4

ANALYSIS OF INITIATION OF ATTENTION CHANGE

Mother's Speech	Description of Activity
	Child watches mother. Mother chooses a toy, demonstrates its features and holds it out to child.
Put together?/	

Complete recording of all maternal utterances were made in terms of their controlling the child's attention or action (Level 2), whether they were prohibitive or directive (Level 3) and their grammatical form (Level 4). The same levels were used in the non-verbal modality to record mothers' behaviour with the exception of level 4 which recorded her use of gestures and manipulatives.

Analyses of Data

All of the data were subjected to non-parametric statistical analysis due to the small sample size, the large variation of the observed frequencies of particular maternal behaviours, and doubtful likelihood of normality in the distribution of the data. Additionally, all the data were ranked so that only assumptions of ordinality were made. The Mann-Whitney-U Test was used for all between- (age)-group comparisons. The Wilcoxon Matched Pairs Signed-Ranks Test was used for all within-group comparisons as it was considered that repeated measures of a mother's behaviour constituted related samples.

Inter-rater reliability estimates of judgments of utterances, toy shifts, and control technique classifications were performed. The two raters scored three one-minute samples from different dyads and the reliability estimates were computed.

RESULTS

The analysis of data collected indicates that mothers' verbal controls directed at the hearing-impaired children studied are more likely to be related to an initiative taken by the mother. They are less likely to follow an initiative taken by the child. For both the younger and older children, only 40% of these maternal controls occur after the child chooses a toy and 60% are initiated by mother (Table 1). In the case of the hearing children observed by Schaffer and Crook (1978) the percentage of child-initiated are 60 and 74 for their younger and older groups respectively.

TABLE I

Number and Percent of "Toy Shifts" Initiated by Mother and by Child

Subjects	Mother-initiated						Child-initiated						Total "Toy Shifts"	
	15 mths		25 mths		Total		15 mths		25 mths		Total			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
1	12*	92	17	52	29	63	1*	8	16	48	17	37	46	100
2	19	58	17*	59	36	58	14	42	12*	41	26	42	62	100
3	9	28	23*	66	32	48	23	72	12*	34	35	52	67	100
4	12	86	18	75	30	79	2	14	6	25	8	21	38	100
5	9	64	34	83	43	78	5	36	7	17	12	22	55	100
6	15	88	9	26	24	46	2	12	26	74	28	54	52	100
Total	67	60	118	60	194	60	45	40	79	40	126	40	32	100
Mean	11.2		19.7		16.2		7.5		13.2		10.5			

*Hearing-impaired mother.

It would seem then, that whereas mothers of hearing children follow an initiative taken by their infants more than 60% of the time, this

was reversed for mothers of hearing-impaired children who take more of the initiative themselves for both age groups observed. There is, in fact, no significant difference between the incidence of maternal initiation of attention vs child initiation for either age group of hearing-impaired children ($T = 3$). Further, the mothers of the older group are no more likely to allow their children initiative than the mothers of the younger group ($U = 10$).

Table 2 provides data on maternal use of verbal controls, whether attention or action. As can be seen, the mothers of the hearing-impaired children of fifteen months use significantly more verbal attention controls than do the mothers of the older hearing-impaired children ($U = 2$; $p = .004$; based upon rank ordered data because of the biasing effect of no vocal communication by two of the hearing-impaired mothers). This is in the same direction as the difference noted by Schaffer and Crook (1978). Additionally, as in their study there is no change in the frequency of the use of maternal action controls across the two age groups ($U = 10$; $p = .12$).

TABLE II

Number and Percent of Mothers Utterances (Verbal) which were Directed to Modifying the Child's Attention or Action.

Subjects	Attention Controls						Action Controls						Total Verbal Controls	
	15 mths		25 mths		Total		15 mths		25 mths		Total			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
1	59*	72	28	36	87	54	23*	28	50	64	73	46	160	100
2	89	58	0*	0	89	58	65	42	0*	0	65	42	154	100
3	36	71	0*	0	36	71	15	29	0*	0	15	29	51	100
4	106	35	55	63	161	42	194	65	32	37	226	58	387	100
5	70	37	43	34	113	36	120	63	84	66	204	64	317	100
6	79	53	26	45	105	50	71	47	32	55	103	50	208	100
Total	439	74	152	26	591	46	488	71	198	29	686	54	1277	
Mean	73		25		49		81		33		57			

*The mother of Child 1 was the only deaf mother who attempted to communicate verbally (vocally or non-vocally) with her child.

When the mothers initiate a toy shift themselves, they, like the mothers of hearing children, are more likely to do so with an attentional control rather than an action control. This situation obtains for both groups observed. For the 15 month and 25 months groups respectively the Wilcoxon $\underline{T} = 0$ ($p = 0.025$) and $\underline{T} = 1$ ($p = 0.0$) for verbal control and for both groups for $\underline{T} = 0$ ($p = 0.025$) non-verbal control (50% in both cases). There are thus no between-group differences on this measure (Table III).

TABLE III

Number and Percent (%) of Attentional and Action Controls when Mother Initiated a Toy Shift

	Verbal					Non-Verbal					TOTAL
	15 mths		25 mths		Total	15 mths		25 mths		Total	
Subject	Action	Attention	Action	Attention		Action	Attention	Action	Attention		
1	1(20)*	4(80)*	8(53)	7(47)	20	2(15)*	11(85)	7(44)	9(54)	29	49
2	2(12)	15(88)	0(0)*	0(0)*	17	2(12)	15(88)	1(7)*	13(93)	31	48
3	2(25)	6(75)	0(0)*	1(100)*	9	1(11)	8(89)	6(30)*	14(70)	29	38
4	1(13)	7(87)	1(8)	11(92)	20	3(38)	5(62)	3(25)	9(75)	20	40
5	5(38)	8(62)	1(38)	18(62)	32	6(46)	7(54)	6(25)	19(76)	38	70
6	2(13)	13(87)	1(11)	8(89)	24	4(40)	6(60)	1(13)	7(87)	18	42
Total	13(20)	53(80)	21(32)	45(68)	112(43)	18(26)	52(74)	24(25)	71(75)	165(57)	287
Mean	2.2	8.3	3.5	7.5		3	8.7	4	11.8		

*Mother was hearing-impaired.

At the non-verbal level no significant differences were noted between the use of controls of attention and controls of action for either age group (Table IV).

TABLE IV

Number and Percent of Non-Verbal Behaviors which were Directed towards Modifying the Child's Attention or Action.

Subjects	Attention Controls						Action Controls						Total	
	15 mths		25 mths		Total		15 mths		25 mths		Total			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
1	37*	42	21	38	58	41	48*	58	35	42	83	59	141	100
2	28	51	23*	62	51	55	27	66	14*	34	41	45	92	100
3	25	61	17*	60	42	61	16	70	11*	30	27	39	69	100
4	29	19	36	54	65	29	126	80	21	20	157	71	222	100
5	32	33	35	51	67	40	65	66	34	34	99	60	166	100
6	25	29	18	41	43	33	62	70	26	30	88	67	131	100
Total	176	34	150	80	326	(40)	344	66	151	50	495	(60)	821	100
Mean	29.3		25		27.2		57.3		25.2		413			

*Hearing-impaired mother.

Other comparisons between the groups indicate that there are no significant differences ($U = 9$; $p = .09$) between mothers' use of verbal directive controls at 15 months and 25 months, that is, they are equally directive for children of both ages. They are, however, more non-verbally directive for the younger group ($U = 5$; $p = .02$). In terms of their use of verbal and non-verbal prohibitives there are no significant differences between the groups ($U = 9$ and $U = 10.5$), indicating that mothers' use of such controls does not change over the age range observed (Table V).

TABLE V

Mothers' Verbal and Non-Verbal Controls Classified as Directoves and Prohibitives

Subject	VERBAL						NON-VERBAL					
	15 mths		25 mths		Total		15 mths		25 mths		Total	
	Directive	Declarative	Directive	Declarative	Directive	Declarative	Directive	Declarative	Directive	Declarative	Directive	Declarative
1	58*	1	93	3	151	4	101*	3	53	3	154	6
2	143	7	1*	0	144	7	52	10	43*	2	95	12
3	97	0	3*	0	100	0	61	0	28*	0	89	0
4	264	3	107	2	371	5	154	20	77	4	231	24
5	153	22	173	6	326	28	100	11	64	12	164	23
6	149	7	92	0	240	7	84	7	51	0	153	7
Total	858	40	469	11	1132	51	552	51	316	21	868	72
Mean	143	6.7	78.2	1.8	47.2	2.1	92	8.5	52.7	3.5	36.2	3

*Hearing-impaired mother

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Level 4 recorded the number of maternal utterances that were imperatives, interrogatives, declaratives or moodless (Table VI), and non-verbally, the number of maternal behaviours that were classified as gestures and manipulatives (Table VII). The mothers' use of imperatives, interrogatives, declaratives and moodless statements for the younger group was compared to these forms for the older group (Table VI) and no significant differences were noted ($\underline{U}$ = 9, 12, 11 and 15).

TABLE VI

Number of Mothers' Utterances Classified as Imperatives, Interrogatives, Declaratives and Moodless

Subjects	Imperative			Interrogative			Declarative			Moodless			Total
	15 mths	25 mths	Total	15 mths	25 mths	Total	15 mths	25 mths	Total	15 mths	25 mths	Total	
1	23*	41	64	10*	15	25	23*	15	38	3*	25	28	155
2	97	0*	97	23	1*	24	21	0*	21	9	0*	9	151
3	30	0*	30	18	1*	19	43	2*	45	6	0*	6	100
4	213	51	264	17	14	31	31	29	60	6	15	21	376
5	29	73	102	24	37	61	16	40	56	0	23	23	242
6	80	17	97	46	30	76	62	24	86	27	21	48	307
Total	472	182	654	138	98	236	196	116	312	51	84	135	1331
Mean	78.7	30.3	54.5	23	16.3	19.7	32.7	19.3	26	8.5	14	11.3	221.8

*Hearing-impaired mother.

In terms of the mothers' use of gestures and manipulatives no significant difference was observed between the two groups for the use of gestures ($\underline{U}$ = 17.5) but the mothers of the younger group used more manipulatives ($\underline{U}$ = 2.5; $\underline{p}$ = 0.006) than the mothers of the older groups (Table VII). The within-group comparison of gestures to manipulatives demonstrated that the mothers of both groups used significantly more manipulation than gesture ($\underline{T}$ = 0; $\underline{p}$ = .025) for both comparisons.

TABLE VII

Number of Mothers' Non-Verbal Behaviors Classified as Gestures and Manipulatives

Subject	Gestures			Manipulatives			Total
	15 mths	25 mths	Total	15 mths	25 mths	Total	
1	41	18	59	63	38	101	160
2	7	51*	12	55	40*	95	107
3	0	0*	0	61	28*	89	89
4	4	19	23	170	62	232	255
5	10	21	31	74	55	129	160
6	22	11	33	73	40	113	146
Total	84	74	158	496	263	759	917
Mean	13.8	12.3	13.2	82.7	43.8	63.3	

*Hearing-impaired mother.

Other within-group comparisons also revealed differences. For the 15-month-group, mothers used significantly more imperative statements than interrogatives or moodless comments ($T = 0$; $p = .025$ for both comparisons). Similarly, the mothers' use of interrogatives and declaratives exceeded their use of moodless statements ($T = 0$; $p = .025$ for both comparisons). There were, however, no significant differences noted between the use of imperatives and declaratives or between interrogatives and declaratives ($T = 2.5$ and $T = 3$). For the 25-month-old group, there were no significant differences in the mothers' use of any of the observed grammatical forms ($T = 6, 5, 3, 6, 5, 7$ and 4 respectively).

As a final point of interest comparisons of the three hearing-impaired mothers and the nine hearing mothers were also attempted. For the verbal measures of all levels, this was not possible as two of the three deaf mothers did not use any verbal language (vocally or non-vocally) during the observed interactions. For all non-verbal levels, however, no significant differences were noted, but this could well be due to the small sample obtained.

As previously described, inter-rater reliability estimates of the two coders were obtained and indicated a high degree of consistency. They were as follows,

(i)	utterance judgments	0.92
(ii)	toy shift judgments	0.90
(iii)	control technique classifications	0.89

The following summary tables show when significance (at at least the 5% level) obtained for between-group and within-group comparisons. Table VIII presents in summary the statistical comparisons of the 15 months group and the 25 month on all of the Levels recorded.

TABLE VIII

Comparisons of 15 months group and 25 month group on Levels 1, 2, 3 and 4 using Mann-Whitney U test.

Significance of Result		Comparison	Level
$U = 10.5$		Mother Initiated "Shift"	
$U = 10$		Child Initiated "Shift"	1
$U=2$; $p=.004$ (15m>25m)	Verbal	Attention Controls	
$U = 10$	Non-Verbal		
$U = 10$	Verbal	Action Controls	2
$U = 7$	Non-Verbal		
$U = 9$	Verbal	Directive Controls	
$U=5$; $p=.021$ (15m>25m)	Non-Verbal		
$U = 9$	Verbal	Prohibitive Controls	3
$U = 10.5$	Non-Verbal		
$U = 9$	Imperatives	Verbal	
$U = 15$	Interrogatives		
$U = 11$	Declaratives		
$U = 15$	Moodless Statements		
$U = 17.5$	Gestures	Non-Verbal	4
$U=2.5$; $p=.006$ (15m>25m)	Manipulatives		

TABLE IX

Comparisons of Mothers' Verbal and Non Verbal Behaviours at Levels 1, 2, 3 and 4 for each of the Age Groups (Wilcoxon Matched Pairs Signed - Ranks Test)

25m GROUP	15m GROUP	COMPARISON		LEVEL
T = 3	T = 3	Mother Initiated "Shift" v's Ch'd Initiated		1
T = 5	T = 11	Verbal	Attention Controls v's Action Controls	2
T = 10	T = 3	Non-Verbal		
T=0; p=.025 (Direct>Prohib)	T=0; p=.025 (Direct>Prohib)	Verbal	Prohibitives v's Directives	3
T=0; p=.025 (Direct>Prohib)	T=0; p=.025 (Direct>Prohib)	Non-Verbal		
T = 6	T=0; p=.025 (Imper>Interr.)	Imperatives to Interrogatives		4
T = 5	T = 2.5	Imperatives to Declaratives		
T = 3	T=0; p=.025 (Imper>Moodless)	Imperatives to Moodless	(Verbal)	
T = 6.5	T = 3	Interrogatives to Declaratives		
T = 7	T=0; p=.025 (Interrog>Moodless)	Interrogatives to Moodless		
T = 4	T=0; p=.026 (Declar>Moodless)	Declaratives to Moodless		
T=0; p=.025 (Manip>Gest.)	T=0; p=.025 (Manip>Gest.)	Gestures to Manipulatives (Non Verbal)		

Table IX summarizes the comparisons at Levels 1, 2, 3 and 4 for the 25 month group and also for the 15 month group.

DISCUSSION

The findings of this study indicate that in a play situation where mothers were given the opportunity to take an assertive role, the mothers of young hearing-impaired children do so in an obvious manner. They allow their children to take less initiative in the choice of toys in the play situation than did the mothers of hearing children observed by Schaffer and Crook (1978). This finding obtained for both age groups observed, and this in striking contrast to the behaviour of the mothers of hearing children studied by Schaffer and Crook, who observed that with increasing age the more active and exploratory nature of children's play let to the mothers according them more initiative than was evidenced for the mothers of the younger children.

When the mothers of the hearing-impaired children did take the initiative they did so in the same way as did Schaffer and Crook's mothers of hearing children: that is, by attempting to redirect their children's attention, rather than trying to change their activity. Mothers' controls of their hearing-impaired children's activity were generally reserved until attnetion had been caught and directed. The mothers of the younger hearing-impaired children spent far more time attempting to capture their children's attention than did the mothers of the older hearing-impaired children. This trend is similarly noted for mothers of hearing children by Schaffer and Crook who felt that the younger children tended to fixate on a particular toy, thus making it more difficult for the mothers to attract their attention away to other toys.

When the actual nature of the maternal control techniques is examined it is evident that the mothers of the hearing-impaired children were as verbally directive with older children as with the younger children. This continued directiveness and the high level of maternal initiation of focus of attention, is in accord with other measures of the direction of mothers of hearing-impaired children recorded by Collins (1969), Schlesinger and Meadow (1972), Seitz and Marcus (1976), and Brinich (1980). It is important to emphasize that even in a play situation where the mother was requested to take an assertive role, Schaffer and Crook (1978) still reported evidence

for mutuality in the nature, timing and adjustment of the mother's controls in relation to her infant's age and on-going activity. It would seem that there is less evidence of this in the behaviour of mothers of hearing-impaired children observed in this study.

Leaving aside the grammatical form of the utterances of mothers of hearing-impaired children, further consideration of the verbal and non-verbal control techniques they used indicates that they were more directive than prohibitive for both age groups. That is, when the mother attempted to change the child's focus of attention, she was more likely to do so by a distraction or a subtle re-direction than by telling the child *not* to attend to or *not* to continue a particular activity. This would seem to be a desirable strategy. The fact that the mothers of both age groups used more manipulative controls than gestures indicates they found actual contact with their hearing-impaired child or the object of attention a more productive means of effecting change or maintenance of the child's attention. The fact that the mothers of the younger children used more manipulative techniques than the mothers of the older group may be the non-verbal parallel to their greater use of verbal attention controls when compared to the mothers of the older group. That is, to ensure the effectiveness of the attention control the mother physically manipulated the child or the object being referred to. This could well be a necessary feature of mothers' interactions with their hearing-impaired children.

Whilst the complexity of verbal language was not examined in this study, the grammatical form of mothers' language addressed to hearing-impaired children indicated no differences according to the age of the children observed. The mothers of the fifteen-month-old children used as many interrogative utterances as did the mothers of the twenty-five-month-old group. This also obtained for imperative, declarative and moodless statements. Such a finding is in accord with the observations of Cross (1980) who concluded that the mother's use of language was determined by the receptive abilities of the child and therefore mothers of hearing-impaired children of all ages would be different in their use of language to mothers of normally hearing children. Examination of the relative proportion of imperative, interrogative, declarative and moodless statements by the mothers of the younger group reveals further differences when compared to studies of mothers of hearing children. The more frequent use of imperatives than

interrogatives by mothers in this younger group is in contrast to the percentages recorded by Snow (1977). Snow noted a higher percentage of interrogative than imperative statements for mothers of hearing children of similar age to the ones in this study. However, Anderson (1978) in her study of the mothers of three hearing-impaired children, observed at this age that the percentage of imperatives was higher than the percentage of interrogatives in two cases and approximately equal in the third. On this measure, the present study would seem to be in agreement with previous studies of the language of mothers of hearing-impaired children of similar age (Seitz & Marcus, 1976; Anderson, 1978; Wedell-Monnig & Westerman, 1977). In the play situation used, the explanation for the high incidence of imperatives could well be related to the similarly high incidence of verbal attention controls used by the mothers of the younger group. It would seem that when the mothers of these younger children found difficulty gaining and redirecting their children's attention verbally they were more likely to resort to imperative statements and non-verbally, to physically manipulate the child and/or the object being focussed on.

The language used by the mothers of the twenty-five-month-old group showed no significant within-group differences in the observed frequencies of imperative, declarative, interrogative or moodless forms. Despite the ranking of all data, this finding could be influenced by the fact that the two hearing-impaired mothers in this group did not attempt verbalization of any kind with their children. Although it was evident to the investiagaor that both were capable of verbally communicating with their children, they made virtually no attempt to do so and relied almost entirely on gesture and manipulation to achieve their purposes. Continuing on this point, one hearing-impaired mother[1] did utilize fingerspelling and sign language in exercising verbal control of her daughter's action and attention. It is worth mentioning that the first two hearing-impaired mothers had attended the same school for the deaf in their youth and that this school had placed rigorous insistence on the pupils' use of *oral* as against manual expression of language. It could well be that both mothers subsequently felt unable to provide a manual model for their children in the situation observed.

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[1] This was the mother of Child Number 1 in the 15 month group.

Anderson (1978) in her study of the mother of Mary at twenty-five months, whilst observing approximately equal percentages of imperative and declarative statements, also noted an increased proportion of question forms addressed by the mother to her hearing-impaired child. Cross (1980) however, in examining the language of mothers of hearing-impaired two-year-olds, records no mean differences in the mothers' use of imperatives or interrogatives, but does find a higher use of declaratives in relation to the other forms.

Although the significance of such differences in comparison to the present study remain un-tested, they point out the observed variability of studies of mother's verbal interactions with their two-year-old hearing-impaired children: the present study indicating that the mothers of the older group are equally likely to use any of the recorded verbal control measures to gain or re-direct their children's attention or activity. It would seem then, that in contrast to the younger group, no definite conclusions can be made in description of the most frequently observed verbal control techniques used by the mothers of the two-year-olds in this study. All than can be said is that verbally they utilized a range of statement forms without particular emphasis on the imperative (as was the case for the mothers of the younger group). As Schaffer and Crook (1978) point out however, the imperative is the most unambiguous verbal control and interrogatives and declaratives can constitute a form of "indirect" command. It is evident from analysis of the transcripts that the mothers of the hearing-impaired two-year-olds employed this less direct approach in their interactions with their children.

The simultaneous verbal and non-verbal coding of mothers' behaviour was found to be advantageous in examining the specific nature of the control techniques used. A case in point involved the mothers of the younger group using a higher proportion of verbal imperatives allied with the frequency of use of non-verbal manipulation to control and direct their children's activity. In general, the verbal and non-verbal behaviors of the mothers were complementary but there were occasions when significant differences were evident. An example of such a difference was noted in the comparison of the two age groups in terms of the mothers' use of directive controls. Whilst the mothers of the younger group were no more verbally directive than the mothers of the older group, they were significantly more directive in the non-verbal mode. Similarly, although not a prime purpose of the study, comparisons of the hearing and hearing-impaired mothers were made possible

by the recording of the mothers' non-verbal behaviors[2]. In these comparisons no significant differences were noted, that is, the hearing-impaired mothers used attention controls as frequently as the hearing mothers, they were no less directive and used as much gesture and manipulation in their non-verbal interactions with their hearing-impaired children. It is felt that without the use of the behavioral coding scheme devised by Schaffer and Crook (1978) many such similarities and differences might well have been overlooked. In general, the more precise description of verbal and non-verbal maternal behaviours at a number of levels has made possible a clearer picture of the specific nature of the control techniques used by mothers with their hearing-impaired children. As shown by the inter-rater reliability estimates, the utilization of the coding scheme, in terms of the discreteness of the categories, presented few problems.

In summary, this study has shown that, in comparison to the mothers of hearing children observed by Schaffer and Crook (1978), the mothers of hearing-impaired children in the same situation were more controlling in their interactions and allowed their children less initiative. Secondly, the mothers of the older group observed were as verbally directive as the mothers of the younger group. The mothers of the older group did however, spend less time attempting to gain the attention of their children. When the grammatical form of the mothers' language was examined there was no evidence of any significant difference between mothers' language addressed to the younger or to the older groups of children. There have been discussed however, a number of important with-in group differences in observations of the mothers' verbal and non-verbal behaviors.

Thirdly, the coding scheme devised by the previous authors was found to be a useful and reliable instrument for more precise description of both the verbal and non-verbal control techniques used by the mothers of hearing-impaired children in this study.

OVERVIEW

Limitations

Any study involving young hearing-impaired children, and the present study is no exception in this respect, is susceptible to a number of

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[2] Because two of the hearing-impaired mothers did not verbalize at all.

limitations. In terms of the recruitment of subjects, the willingness of parents to co-operate in the study is a possible source of bias, but given the small population of hearing-impaired children of the ages observed this effect would seem to be minimal in the current study. The inclusion of the three hearing-impaired mothers was a choice taken because the researcher was faced with the problem of selecting a truly representative sample of mothers or of selecting a homogeneous group fitting rigid and limiting criteria. A further reason for including the hearing-impaired mothers was the size of the pool from which subjects could be drawn. The admitted limitation in this is that although hearing-impaired children of hearing-impaired parents represent only 10% of the deaf population, they represent 25% of the sample in this study. Also in relation to this sample, the imbalance of males to females could be a further source of bias. This is particularly evident for the older group which was comprised of four boys and only two girs.

The etiology of the children's deafness was a factor that was not examined in any great detail but it is evident that some etiologies have a higher probability of undiagnosed additional disabilities. On this point, the reliance of the investigator on the school and teachers' reports that the children were at least normal intellectually, could be questioned. There is however evidence, that teachers' judgements in studies of this kind, are relatively accurate (Meadow, 1978). No measures of the complexity of the mothers' language were made in this study as the collection of such information was not within the initial purposes of the study. In retrospect, data on MLU could have been used to make comparisons to other studies of the language of mothers of hearing and hearing-impaired children. Additionally the inclusion of an age-matched sample of normally hearing children and their caregivers could have permitted more comparisons than were possible to the limited information provided by Schaffer and Crook.

Some concern must also be expressed about the number of recording venues that were necessitated by geographic distribution of the subjects, particularly as much of the recording was done at parent guidance centres. Belsky (1977) noted that the effect of setting was significant in observations of mothers' interactions with their children, to the extent that they talked to, attended to, responded to and stimulated their children more frequently in the clinical "laboratory" situation than at home.

Finally, the effect of the task instructions on the mothers could be questioned, in that they were requested to encourage their children to play with as many of the toys as possible. Although this was done to highlight the mothers' range of control techniques, their behavior could well have been altered by the perceived demand characteristics of the task and situation. However, as has been stated previously, Schaffer and Crook still found evidence for mutuality even when the mothers were asked to take this more active role.

Theoretical Implications and Further Research

The present study has heightened the authors' concern in relation to the small number of multt-subject and single-subject studies of the early social development of hearing-impaired children, in particular, those concerned with examining the nature of the relationship between the infant and its caregiver. The lack of such studies is really not surprising as this field is an emerging one where related studies of normally hearing children and their caregivers are still examining dyadic characteristics at different developmental stages and the respective contributions that mother and child make to interactions. There has been however, for some time a growing awareness that many developmental issues can be examined by studying the development of hearing-impaired children (Furth, 1961; Cross, 1980) and because of this some information on this group has been obtained. In terms of the ages observed, the present study represents one of few studies of mothers and their hearing-impaired children, in particular the age of the younger group examined. There is obviously a need for many more studies of this type especially with younger children to document the effect of hearing-impairment on the socialization process.

Where the child is not handicapped, it is obvious that a considerable responsibility lies with its caregiver to ensure that the infant's early social experience is suitably structured. This study, in conjunction with previous literature (Schlesinger & Meadow, 1972; Brinich, 1980) has shown that the mother of the hearing-impaired child is more controlling in interactions with her child. Evidence is needed as to whether this is in response to a natural demand felt by the mother, or as Schlesinger and Meadow (1972) suggest, in response to the "training" received by mothers from "experts (p. 109)" in the handling and socialization of hearing-impaired

children. Further studies of this kind have importance for all services concerned with assisting the caregivers of young handicapped children. The behavior has also been demonstrated in the present study. A particular point in this respect could be questioning the appropriateness of the high degree of mothers' physical manipulation of the child and his immediate environment. The behavioral coding scheme devised by Schaffer and Crook has value for other investigators and practitioners in the field as it can provide detailed information of the mother's behavior in interacting with her hearing-impaired child. Difficulty still remains in relation to judgments of the appropriateness of adaptations in maternal style, and also as to realistic expectations of producing changes in maternal style through intervention.

In view of the findings of the study in relation to the hearing-impaired mothers, further research might well be concerned with comparisons of this group to their hearing peers on a non-verbal basis as well as on previous verbal measures. The measures of the language that mothers addressed to their hearing-impaired children, being in concurrence with those recorded by Cross (1980), further indicate that maternal speech features seem related to the perceived receptive abilities of the child. Research on these measures that is comparable to that with mothers of hearing children, should not always be conducted on the basis of age-matching. It should also include as suggested by Cross matching for linguistic competence, at different stages, of the hearing to the hearing-impaired children.

Finally, in consideration of the control techniques used by mothers of hearing-impaired children, the conclusions of Schaffer and Crook (1978) seem particularly appropriate.

> "Socialization thus emerges as a process based on mutuality. It is not arbitary imposition by a powerful being on another, utterly passive being. If a mother wishes to bring about some change in her child she needs to start within the context of his own behaviour (p. 77)".

When a mother finds it difficult to establish reciprocal communication with her child because of his hearing-impairment (or mental retardation) her adaptation to that situation may well be through emphasizing control of the relationship with her child.

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